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IMPROVING PUBLIC SECTOR PERFORMANCE
IN ISLAND DEVELOPING COUNTRIES
THROUGH MODERN INFORMATION TECHNOLOGY

by

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EXECUTIVE SUMMARY

Background

(i) Fundamental improvements are needed in the decision-making and management capacity, and in the day-to-day functioning of the public sector in most island developing countries (IDCs) to address the planning and management problems which seriously impede their economic and social development. The utilization of modern information technology (IT) is an important tool in this connection.

(ii) The paper aims at answering four questions:

1. How can the application of information technology improve the decision-making capacity and functioning of the public sector in the IDCs?
2. What is the status of information technology use in the IDCs?
3. What are the issues involved?
4. What can be done by the IDCs themselves, and by the international community, to improve the situation?

Development planning and management issues in the IDCs

(iii) The inherent disabilities and problems of IDCs transform into three basic development planning and management issues: a narrow range of development options, a limited resource base, and a high degree of vulnerability. The IDCs must face these issues under constraining financial, administrative, demographic, and technological factors.

(iv) The application of IT can expand the range of development options available to an IDC, improve the utilization of its resources, and reduce the vulnerability of development results achieved, while at the same time offsetting some the constraining factors that are limiting the available solutions.

IT developments in the IDCs

(v) Against this background the use of IT is spreading into the IDCs. Links to former metropolitan powers, aid, and technical and market influences from nearby developed countries have strongly influenced and often shaped the IT developments in the IDCs. Regional information systems have, both in the Caribbean and the Pacific, in some cases stimulated computerization at the national level.

(vi) The most common areas of application are statistics, government accounts and payroll. Other applications include land information, personnel information, customs administration, library operations and utility billing. At the regional level, computerized information systems include monitoring of fisheries in the extended economic zones, disaster preparedness support, and a number of statistical and bibliographic data bases.

Gap between achievements and IT potential

(vii) However, despite considerable investments in IT, and a number of highly successful IT applications, a large gap exists between the potential benefits of the utilization of that technology in the IDCs and what has until now been achieved. Measured in relation to the investments made in IT and information system development in the IDCs, the results are also limited.

Issues

(viii) The underlying reasons for this situation relate to the availability of data, the general conditions of computerization and use of information in the IDCs, the way in which IT is being introduced, and the role of international aid. The common denominators are lack of strategy and coherency of IT developments, failure to address fundamental requisites of computerization across the government sector as a whole, failure to realize that IT developments are tantamount to institution building, and failure to realize the international dimensions of IT developments in the IDCs. The way in which international aid is being provided is often compounding the problems.

(ix) While the particular conditions and problems of IT development obviously vary from country to country, the fundamental issues are the same. The solutions are, therefore, to a large extent common.

Elements of an action plan

(x). Development and time will not make the issues go away and provide conducive conditions for an effective utilization of information technology in the IDCs. A conscious, systematic effort by the countries, their regional organizations, and the donors is needed. The last chapter of the report outlines critical elements of an action plan aimed at achieving this goal.

I. INTRODUCTION

Background

1. Island developing countries (IDCs), whether in the Caribbean, the Pacific or Indian Ocean, face problems in the area of public sector planning and management which seriously impede their economic and social development. While development plans are often well conceived their implementation is generally weak. A bureaucratic and ineffective public administration often compounds the problems.

Need for improved decision-making capacity in the IDCs

2. Fundamental improvements in the decision-making and management capacity, and in the day-to-day functioning of the public sector are needed in most IDCs if this situation is to be amended. A growing number of "administrative reform" and "restructuring" programmes indicate that both the countries and the donors are beginning to realize that more comprehensive and systematic efforts are required to effect such changes.

Role of IT not addressed

3. Administrative reforms and the use of modern information technology (IT) are closely linked. Today, organizational development is more or less synonymous with computerization and office automation. However, while administrative reforms necessarily must take place at the national level, and are intimately related to the local environment, the utilization of information technology is much more international. In particular in IDCs many information systems and their technical basis, which are requisite for administrative development and improved decision-making at the national level, can only be established through international cooperation.

4. Previous discussions of IDC development issues have just given limited thought to the planning and management problems of the public sector. And none of these discussions have considered the potential of information technology in island developing countries, and the issues and requisites involved.

Purpose of paper

5. The present paper aims at addressing the following four questions:

- a) How can the application of information technology improve the decision-making capacity and functioning of the public sector in the IDCs?
- b) What is the status of information technology use in the IDCs?
- c) What are the issues involved?
- d) What can be done by the IDCs themselves, and by the international community, to improve the situation?

Mission Nov-Dec 1989

6. In preparing the paper the author, during November and December 1989, undertook a mission to selected IDCs in the Caribbean, the Pacific, and the Indian Ocean. The paper is furthermore based on the author's experience from 1985 to 1989 as responsible for a regional Government Information Systems Programme executed by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP).

Organization of paper

7. The paper is organized into four main chapters corresponding to the above questions. Chapter II discusses development planning and management issues in IDCs, and the potential of information technology in this connection. Chapter III contains a review of the present and planned use of information technology in the IDCs. Chapter IV discusses the issues and requisites involved in realizing the IT potential in the IDCs. Chapter V finally outlines an action programme aimed at assisting IDCs in this connection.

8. Annex A contains a list of persons consulted during the November/December 1989 mission. Annex B lists the documents and references consulted during preparation of the paper.

Acknowledgments

9. The opinions and recommendations of the paper are those of the author, and are his sole responsibility. However, many people have contributed. In this connection I wish to thank the Government officials of island developing countries and the staff of international organizations whom I met during the mission, and who through their great availability and open and frank discussions greatly contributed to its results. I would also like to thank the UNDP offices in Barbados, Apia, Suva, and Male, and the UNCTAD offices in Geneva and New York for their invaluable professional and practical support in connection with the mission.

II. THE POTENTIAL OF MODERN INFORMATION TECHNOLOGY

10. The problems to be addressed must be the starting point for evaluating the potential of any technology. The present chapter, therefore, begins with a discussion of the characteristics and issues of development planning and management in the IDCs and the constraints decision-makers in these countries are facing in dealing with those issues. On this basis the potential of information technology is then discussed.

2.1 Development Planning and Management in IDCs

11. The intrinsic disabilities and problems of island developing countries are discussed in references 1-4, see Annex B. From a development planning and management point of view those disabilities and problems transform into three fundamental issues which all IDCs must face:

- A narrow range of development options
- A limited resource base
- A high degree of vulnerability.

Narrow range of development options

12. The development options available to IDCs are limited by the size of national economies, remoteness, geographical and ecological factors, climate, traditional commercial relationships, lack of infrastructures, lack of skills, etc. Generally, the smaller, the more archipelagical, and the more remote a country is, the more limited are its development options.

Role of information

13. The role of development planning is not only to chart a way to exploit those options, but more importantly to expand the range of available options, and to constantly keep the options open to new opportunities, e.g. created by technological developments. This can be seen as the innovation process of development. The transfer of information between researcher and development planner and innovator, between the developed countries and the IDCs, is closely related to this process. It is to be expected that formal information systems will facilitate more efficient information transfer required for innovation.

Limited resources

14. Island developing countries normally have to face limitations in regard to all types of resources: physical, human, economic, technical, etc. In regard to public administration lack of skilled human resources is without exception cited as the most critical and urgent problem.

15. The role of development planning and management, obviously, is to make as efficient and effective use as possible of the available resources, and to expand the resource base, both in the short and longer term. This constitutes the implementation process of development management. Management information that provides the basis for monitoring the implementation and its results, and for taking corrective action whenever needed, is a basic requisite. Also here it is to be expected that effective information systems will facilitate the process.

Vulnerability

16. In the IDCs vulnerability problems characterize both the development results that have already been achieved, and the availability of physical, human, economic and other resources for realizing further development.

17. Examples of external risk factors which impact IDCs are natural disasters, the rising sea level, economic fluctuations and changes in World markets, changes in regulations of former metropolitan countries, e.g. regarding immigration or trade, unpredictability in regard to aid contributions, and technological developments.

18. Another vulnerability factor is dependence on expatriate expertise in both private and public organizations. In many IDCs, particularly in the Pacific, key Government jobs are often held or supported by expatriates who are 'on loan' from the former metropolitan countries. When expatriates depart, even if being replaced by new ones, there is a high risk that build-up experience and know-how disappear.

19. A critical aspect of all development planning and management activities in the IDCs, therefore, is risk evaluation and management aimed at reducing the vulnerability caused by the above risk factors.

20. While risk management techniques, including establishment of the related information systems, are being applied increasingly in the IDCs in regard to natural disasters (early warning systems, contingency planning, etc.), such techniques have yet to permeate other areas.

2.2. Constraining Factors

21. The IDCs must face the above planning and management issues under a number of constraining and limiting factors:

- Financial
- Administrative
- Demographic
- Technological

Financial constraints

22. Problems of financing are first of all caused by the high per capita infrastructure and administrative costs which characterize most IDCs. Generally, there are minimal economic scales and standards for technical facilities such as transportation and telecommunications systems, or power plants. The same is the case for most public services such as health and education. The small scale of IDCs, therefore, condemns them to severe diseconomies in the installation and maintenance of most infrastructural elements.

23. The high per capita infrastructure costs represent the strongest argument against applying a per capita income criterion as basis for graduation of IDCs from World Bank borrowing privileges. From a policy and management point of view those costs represent a strong and continuous argument for seeking regional solutions to IDC problems.

Administrative constraints

24. Most IDCs have gained independence during the last 20 years, and the organization and staffing of the public sector, therefore, often still reflect the situation of the colonial days. This means that they in many cases are

more suited to the administration of rules within a given framework (traditionally provided by the metropolitan powers) than to the planning and management of economic and social development of an independent nation.

Examples of this "colonial heritage" are:

Colonial influences

- Communication, trade, education, economy, etc. are often still tied to the former colonial powers rather than to neighboring states in the region;
- Lack of management capacity, in particular in regard to independent decision-making;
- Lack of planning capacity;
- Low level of education among civil service staff;
- Statistical systems biased towards the production of trade statistics;
- Lack of an "information culture" among politicians and management level civil servants (limited or no perception of information as a resource).

25. Many IDCs thus have a public sector administration, which is inherently ill-equipped to handle modern days development issues and programmes. This fact limits, at least in the shorter term, the practical solutions available to many problems.

Demographic constraints

26. The lack of skilled manpower is, as mentioned above, a critical problem in all IDCs. Demographic factors often amplify the situation and make solutions more difficult.

27. In most IDCs there is a tendency for skilled and educated labour to seek employment abroad where job opportunities and compensations are better. In some cases restrictions in immigration, and selective immigration measures by the metropolitan countries have led to a phenomenon of decreasing total net emigration together with increasing net emigration of skilled labour from IDCs.

28. In addition to creating severe problems for manpower planners, this situation puts IDCs at a further disadvantage of a human resource base that is inadequate to take advantage of the more efficient types of technology. It also means that IDCs, to secure a supply of skilled and educated staff, must train people on a greater scale than its anticipated requirements.

Technological constraints

29. Many island developing countries realize that new technology often represents some of the more promising prospects for creating new development opportunities. Scientific advances in biotechnology and material sciences have for example created new techniques which some IDCs now enjoy in agriculture and mining.

30. It is also realized that competitive production in traditional areas requires that IDCs are able to take advantage of technological developments in those areas.

31. This interest in, and dependence on, technological development was inter alia reflected in CARICOM's adoption in March 1988 of a regional policy for science and technology, followed by the inauguration of a Caribbean Academy of

Sciences in Trinidad and Tobago. Its objective is to ensure close integration of science and technology into the planning and development of the Region's economies.

32. The smaller and the more remote an IDC, the more difficult is its access to technology and technological developments. Availability in the market place requires for most of the more advanced technologies an economic scale and a supporting infrastructure of skilled labour, maintenance facilities, etc., which do not exist in most IDCs.

33. This means that most technology transfer to IDCs must take place in the context of Government and aid-supported programmes. Here, the biggest problems are lack of information about relevant technologies and their practical potential in the local environment, and lack of skilled personnel who can actually acquire and apply the technology.

2.3. Potential of IT and Telecommunications

34. The use of modern information technology, in particular microcomputers, is spreading into all IDCs. The technology is seen as a natural and often necessary tool in most development projects. Viewed in a broader context IT can assist the IDCs in addressing their fundamental development planning and management issues and in overcoming some of their inherent limitations and constraints. A few examples will illustrate this.

Development Objectives

Expanding development options

35. Access to relevant and up-to-date information is a vital element of all planning. Computerized data bases and telecommunications can drastically expand the information available to development planners, and thus assist in identifying development opportunities. Computer modeling and simulation can greatly enhance the analytical capacity of planners making realistic evaluation of more options feasible and more accurate. Access to remote data bases via telecommunications can for example provide information about trade opportunities, scientific and technological developments, development projects in other countries, etc. Computer based systems, such as a Debt Monitoring and Financial Analysis System (DMFAS) developed by UNCTAD, can assist development planners in making better economic decisions.

Development of service industry

36. Many IDCs consider the development of services as key to economic growth. References 1-4 list several examples: tourism, leasing of fishing rights in EEZs, income from satellite tracking and meteorological stations, off-shore financial services, off-shore medical schools, data processing, trans-shipment facilities, servicing of aircraft, etc.

37. Generally, services have a much higher information content, and thus require better information processing and communication facilities than traditional production industries, such as agriculture. The use of information technology, therefore, often is a "sine qua non" for developing viable new services.

38. In this connection modern telecommunications can reduce and sometimes eliminate the inherent disabilities of remoteness that characterizes many IDCs, and make the development of new "remote service" industries possible.

39. American Airlines has for example located its airline reservation centre in Barbados. A number of American magazines maintain their subscribers lists in the Caribbean. These industries serve their customers on the US continent through computer systems and telecommunications links, taking advantage of the lower labor costs in the Caribbean while the technology eliminates the distance problem. It has also been suggested that design of clothing might be done in an IDC and thereafter transmitted all over the world to relevant producers.

40. In the Pacific a computer and telecommunications based information system at the Forum Fisheries Agency in Honiara, Solomon Islands makes fisheries licensing and monitoring in the vast extended economic zones (EEZs) of the Forum countries feasible. This task could not be undertaken without information technology. The FFA information system is now being copied in the Caribbean.

Improved decision making - the role of microcomputers

41. The microcomputer has brought modern information technology within economic and practical reach of even the smallest IDCs, and vastly improved the possibilities of creating user-friendly decision-support systems. It provides an effective, inexpensive and flexible means of processing data into information and presenting this information to the decision-maker; networked, it becomes a tool of accessing remote data and a means of assembling data from different sources. The microcomputer provides as no other tool the decision-maker with the possibility of working directly and privately with the available data, and with their transformation into information.

Better utilization of resources

42. Both in the developed and developing countries productivity improvement has often been the stated purpose of introducing computers into public sector functions. While the intention in the developed countries in some cases have been staff reductions, i.e. to do the same with less resources, the objective in developing countries generally has been to achieve more with the available, limited resources.

43. In island developing countries administrative computer applications, such as payroll, revenue collection and government accounts, can contribute to better utilization of scarce skilled staff resources in those areas. Office automation can, together with professional and managerial support applications, improve productivity at all staff levels. Statistical applications will generally, in addition to providing better and more timely information, result in productivity improvements in the processing of statistical data; those productivity improvements can then be transformed into production of more ad hoc and specialized statistics, or can free professional staff in statistics offices for advisory services to other departments.

44. Computer supported project management can provide better follow-up on the implementation of development projects, and thus ensure better utilization of the allocated resources. Personnel information systems can enable better utilization of staff resources in public organizations.

45. Land information systems, based on computerized records, might improve the utilization of physical resources. This could be of importance in the Pacific IDCs where land records, in particular regarding the existing rights on land, are often sparse or non-existing.

Primary and secondary information systems

46. In evaluating productivity impacts it is useful to distinguish between primary and secondary functions and the related information systems, and between the corresponding computer applications. Education, health, social services, industrial development, infrastructure development, revenue collection, national security, and foreign affairs are all examples of primary government functions. Government accounts and payroll, and many office functions, are on the other hand examples of internal support activities, i.e. secondary functions, which do not in themselves represent an objective of the Government, but are necessary to support the implementation of primary functions. Generally, productivity improvements that relate directly to the execution of primary functions will have a much higher impact on overall Government operations than productivity improvements that solely relate to secondary functions.

Reducing vulnerability

47. Presently, six OAS member states are testing a computer and telecommunications based regional emergency information system (EIS), see ref. 9. The system, which is part of a Natural Hazards Project (NHP) of the Organization of American States (OAS), will eventually comprise a geo-referenced database with information about natural resources, natural hazards, population, technical infrastructures, etc. in the participating countries. The system will, through its inventory of regional resources, assist participating countries in locating available facilities, expertise and other resources, and in setting priorities, to achieve a speedy recovery and relief after natural disasters.

Reducing Organizational Constraints

Reducing dependence upon individuals

48. Computerized systems in the public sector can reduce that sector's dependence on individuals, and thus its vulnerability to individuals leaving, being sick, etc. Automation of administrative functions such as payroll and accounts, which are characterized by periodic peak-load situations, reduces staffing requirements of such peak-loads, and thus increases system robustness. The use of expert systems can support the "soft aspects" of technology transfer, and thus ease IDCs' dependence on expatriate staff.

Reducing financial constraints

49. It was pointed out above that regional cooperation is one of the practical ways IDCs can overcome the financial limitations caused by smallness, e.g. in connection with development and implementation of capital-intensive infrastructure systems. Regional cooperation and solutions will normally require more sophisticated information systems than national-level solutions. Computers and telecommunications can assist in establishing such regional information systems, and are often a requisite for the creation of this type of systems. In this way the application of IT might in many cases be a key element in overcoming some of the financial constraints that characterize the IDCs.

50. Nine OECS countries in the Caribbean are presently implementing an Automated SYstem for CUSTOMS DATA (ASYCUDA) developed by UNCTAD in Geneva, see ref. 9. It is expected that the introduction of system, due to the resulting better and more systematic valuation, among other things will lead to an average 20% increase in customs revenues in the participating countries. As

customs revenues generally constitute 60% or more of total Government revenues in these countries, the financial impact of this IT application will be considerable.

Offsetting administrative constraints

51. Today, administrative developments are inconceivable without information technology. Experiences from all over the world illustrate that the computer is a powerful tool for organizational change and improvement. The above-mentioned ASYCUDA project is a good example. In addition to support better valuation and reduce the related problem of false invoicing (and thus increase revenues), introduction of the system will result in streamlining of administrative and management procedures in the customs offices. The system will eventually also allow direct electronic communication of data on trade transactions between countries, greatly simplifying the administrative procedures and paper work of international trade.

52. Archipelagic IDCs face special and often serious problems in establishing and operating administrative systems that can support nation-wide Government functions and services. Computers and telecommunications can to a high degree alleviate those problems. The combination of central data bases, that can be accessed via telecommunication links from remote offices, and programmed administrative procedures in the form of computer applications make decentralized administrative functions feasible without requiring duplication of central expertise at the local level. The later years' developments of powerful, robust and inexpensive microcomputers and easy to use software tools have in this connection brought the technology within practical reach of even the smallest IDCs.

53. The information technology will thus play a major role in realizing the necessary administrative reforms in the IDCs during the coming years.

Relieving demographic constraints

54. In most IDCs lack of skilled personnel and management, together with the difficulties in changing this situation, constitute the key problems of establishing a well-functioning public administration and adequate public services. The traditional solution is use of expatriate staff, which however introduces problems of dependency and continuity.

55. Computerization can reduce the need for human expertise and resources in day-to-day operations, in particular for routine types of tasks, cf. also above under reducing the dependence on individuals. Generally, administrative computer applications make it easier to deal with peak-load situations and thus reduce the need for additional staff resources for such situations. Recent developments in the area of expert systems, see ref. xxx, have provided new powerful tools which enable better utilization of existing expertise, and make it possible to retain and apply external know-how after expatriate staff have left.

Reducing Technological Limitations

56. Computers and telecommunications can facilitate the monitoring of technological developments and assist the IDCs in identifying and evaluating the potential of those developments in the local context. Information technology can further play an important role as a tool of technology transfer.

Access to technology

57. Computerized documentation services have, supported by telecommunications, made access to up-to-date scientific and technical literature much easier, and in principle feasible even from the remotest IDC. Such services provide the practical means for continuous monitoring of technological developments in selected areas. The project data banks of international organizations constitute another source of information on experiences that might be relevant in the local environment of a particular island developing country.

58. Access to information does not in itself solve the problem of identifying relevant technological developments in an IDC. Scientific and technical expertise, that seldom exists in the IDCs, is needed to scan the information and evaluate the practical potential of those developments in the local environment, and to carry out detailed feasibility studies. Therefore, to support technological developments in the IDCs the main users of scientific and technical documentation services realistically will be regional organizations such as the South Pacific Economic Commission (SPEC), the Organization of Eastern Caribbean States (OECS), and the above-mentioned Caribbean Academy of Sciences, that can support secretariats with high-level professional expertise, and international aid organizations.

Transfer of technology

59. Identification of relevant technologies is in many ways the easy part of effecting technological developments in the IDCs. The actual transfer of a particular technology to an island developing country in such a way, that the technology can be supported and maintained locally, is generally much more difficult. While the identification of appropriate new technologies and preparation of proposals for utilizing them to a high degree can be done by foreigners, the implementation, use and maintenance of such technologies are tasks that primarily must be undertaken locally.

Expert systems

60. In relation to technology transfer expert systems represent an interesting and very promising new medium. Although computer applications that simulate human intelligence and decision making have been known in areas like engineering design and game playing for more than 30 years, until recently they were only of theoretical interest to the general user. Development during the last few years of microcomputer-based, high-level software tools for implementation of expert system applications have changed this situation. So-called expert system shells make it possible to encapsulate human expertise and know-how in a computer system, and thereby make this expertise and know-how available for use by non-experts.

61. Technology transfer to a developing country comprises three elements:

- Transfer of the physical technology
- Transfer of theoretical knowledge about the technology
- Transfer of practical know-how and experience about the use of the technology

62. Transfer of the physical technology is generally the simplest task, and is first of all an economic and practical problem. Transfer of theoretical knowledge is generally accomplished through training and education, sometimes abroad. Both these tasks have in many cases been concluded quite successfully.

63. The difficult task is transfer of the practical know-how and experience about the application of the technology that have been accumulated through practical work often over many years in the developed countries. The traditional means here is technical assistance in the form foreign experts who will be stationed in the developing country for a limited period to assist with implementation of technology applications. The central problem in this connection is, that generally practical experience and know-how are not well-structured and documented. That knowledge is most often "stored in the head" of the expert who applies it intuitively. In many cases this knowledge is not transferred and leaves when the expert departs leading to continuity problems, and frequently to a non-successful technology transfer.

64. Especially in the IDCs, where local manpower resources are particularly limited, technology transfer in a true sense, therefore, has seldom been accomplished, leaving the IDCs dependent upon continuous technical assistance and expatriates to make use of modern technology in many areas. The application of information technology in the form of expert systems, however, holds prospects for changing this situation.

III. IT DEVELOPMENTS IN IDCs

65. IT-developments in the IDCs can be viewed at three levels: in the IDCs themselves, at the regional level, and at the global level. The present chapter reviews information technology developments in the island developing countries from these three points of view.

66. The review does not intend to provide a complete inventory of IT applications in the IDCs. The purpose is to give a general picture of the state of computerization in the IDCs and identify some of the major characteristics and trends in this connection.

3.1. National-level Developments

67. The later years' development of microcomputers and packaged software has made information technology easily available to even the smallest IDC. Today computers can be found in many government agencies in island developing countries all over the world. Computers are becoming a natural element of IDC government operations with those operations becoming increasingly dependent upon the technology.

Outside forces Links to metropolitan powers

68. Computer developments in the IDCs have to a high degree been initiated and driven from the outside. Administrative relations to the former colonial and metropolitan powers have played a major role and been a prime catalyst of computerization in the public sector in many of those countries. Geographical nearness to technologically advanced countries, e.g. the closeness of the Caribbean states to the U.S., has also played a role. In some cases central computer centres were established by the colonial and metropolitan powers before independence and have continued to play an important role. Examples are government computer centres in Fiji and St. Vincent, and computer installations in the former U.S. Trust Territory in the Pacific.

Aid

69. After independence computerization in the public sector have first of all been stimulated by aid programmes. Most technical assistance projects comprise a computerization component, at least to support project management. A number of aid projects have, as a main objective, aimed directly at computerization of government operations. A common example is provision of computers and technical assistance for population census work. And expatriate staff on loan from donor countries have often brought computers with them.

Regional information systems

70. Regional information systems, cf. below under section 3.2, have in a number of cases stimulated computerization at the national level. In the Pacific, the information system established by the Forum Fisheries Agency has lead to computerization of a number of national Fisheries Offices. In the Caribbean, regional information systems in the library and documentation field have stimulated computerization in national-level libraries.

Private sector

71. Likewise, computerization in the private sector has often been effected through links to companies abroad. Many businesses in the IDCs, such as banks,

insurance companies, hotels, travel bureaus, trading companies, etc., are subsidiaries of companies in the former metropolitan countries. Here, computerization has generally been introduced as part of computerization programmes in the mother companies. During the later years microcomputer developments and the availability of commercial turn-key applications and packaged software have further stimulated computerization in local industries in the IDCs.

Statistical applications

72. In most countries processing of statistical records was one of the first computer applications. This is also the case in the IDCs. Before independence particularly the collection and reporting of economic and trade figures back to capitals were important to the colonial powers. After independence the former colonial and metropolitan countries, now in the role as donors, and international development aid organizations have stimulated the establishment of a broader statistical base in the IDCs to support the identification and formulation of aid programmes and for monitoring their impact. Computerization has been an important element of this strengthening of statistical activities in the IDCs.

Institutional and technical assistance

73. United Nations Fund for Population Activities (UNFPA) has for example provided computer equipment and technical assistance to population census work in many IDCs. The World Health Organization (WHO) has in a similar way supported the development of health statistics in many IDCs. In the Pacific the statistics organizations in Australia, New Zealand, and the UK have provided extensive assistance to statistics offices in the IDCs through temporary stationing of experts in those offices, exchange programmes for IDC statistical staff, computer operations, etc. A number of UN bodies, such as the regional commissions, have provided assistance through regional advisers specialized in various fields of statistics.

74. This international support to statistics will probably continue during the coming years, although at a somewhat reduced level. Recently, there has been a shift of the support from general vital statistics towards socio-economic statistics, e.g. household surveys, and statistics covering special areas such as energy, tourism, and employment. This trend is likely to continue.

Mixed results

75. Despite the comprehensive and lengthy support to the development and computerization of statistical activities in the IDCs the results are mixed. The extent and level of computerization in the statistics offices of the IDCs vary greatly, ranging from extensive and systematic utilization of computers as in Fiji, Papua New Guinea and Kiribati, to no use of computers as in St. Vincent. In a number of cases planning offices and ministries complain that "statistics does not provide any relevant information", and start collecting and processing their own statistical data.

76. The common picture is one of computerization of existing statistical procedures. The main purpose of introducing information technology appears to have been faster production of the traditional statistical publications, i.e. to provide more timely and up-to-date statistics, rather than to produce something new. In some cases computerization has resulted in informative graphical presentations of statistical data. An example is the Statistical Year Book produced by the Ministry of Planning and Environment in the Maldives.

Financial applications

77. Financial applications, in particular government accounts and payroll, constitute another area where computerization has been widely introduced. Also here the links to the former colonial and metropolitan states have played a major role.

U.S. Trust Territories

78. When the status of the Trust Territory of the Pacific Islands, for instance, was changed to a Compact of Free Association, which resulted in the establishment of the Federated States of Micronesia, the Republic of Palau, and the Republic of Marshall Islands, the U.S. funded a decentralization of computing facilities to the new state capitals from the former Trust Territory's administrative centre in Saipan. At the same time the U.S. Congress made it a condition for the agreed upon financial support to the new states that they should computerize their financial accounts, payroll, tax, and social security. WANG, which had provided the computer facilities in Saipan (and which is a major vendor for the U.S. Government), was opted for to supply the computer equipment, and an American software company IDC in Chicago was selected to develop the necessary application software in this connection.

79. The same computer equipment and software have subsequently been installed in other U.S. Territories, for example American Samoa and the Virgin Islands.

Provincial systems

80. Also at the national level computerization in the financial area has been an important factor in decentralization efforts. In Papua New Guinea a financial management development project aiming at the provincial level has been implemented with Australian and UNDP assistance, and with UNDTCD as executing agency. The resulting financial computer applications comprise budget control, accounting, and revenue collection.

Government computer centres

81. Ministries of Finance have been the preferred location for government computer centres. Financial applications have as a result often become the dominant and most advanced computerized information systems in those countries. In St. Vincent government accounts and payroll are the first applications being transferred to a new computer system in the Government Computer Centre. In

Papua New Guinea the government payroll is the only major application of the Government Computer Centre which here is operated under the auspices of the Personnel Management Department. In Fiji, where the Government EDP Services organization is located under the Ministry of Finance, the largest and most sophisticated application implemented on a new computer system, that was installed in 1986/87, is an on-line government accounting system.

Microcomputer applications

82. Financial applications have also stimulated computerization developments at the microcomputer level. In Kiribati, the need to replace an ailing accounting system and develop related tax and payroll applications in the Ministry of Finance, in 1987 lead to formulation and approval of a Government Computerization Policy. This policy stated that future computer applications would be based on standardized microcomputer equipment and packaged software.

As a result a central information technology unit has been established for the Government sector as a whole, microcomputer equipment has been acquired, and a new accounting package installed in the Ministry of Finance.

MIS applications

83. Accounting applications is one of the few areas in the IDCs where management information is being provided systematically, and is being used for decision-making by the receivers. A main purpose of the accounting system in Fiji is to improve the quality of economic decisions in the various government departments. In St. Vincent and the Grenadines the traditional batch-oriented accounts application is "providing useful information for management purposes on a regular basis".

Limited and varied impact

84. While a number of successful financial applications, as mentioned, can be identified in the IDCs the overall picture is, as with the statistical applications, a very uneven one. In most IDCs there is scope for major improvements in this area. With few exceptions like Fiji existing financial computer systems only support economic decision-making within Ministries of Finance. Therefore, their impact on overall economic performance of Governments is often limited.

Sectoral applications

85. Sectoral utilization of information technology, i.e. IT applications in areas like education, health, employment, industry development, etc., represent in the longer term the largest potential of the technology in regard to overcoming the intrinsic problems of the IDCs, cf. also above in chapter II about primary information systems. Such utilization is, however, even more limited and uneven than the use of computers for financial and statistical applications described above.

Land information systems

86. Lack of information on rights of land, first of all caused by the large areas of custom land, is as earlier pointed out one of the most serious planning problems in the IDCs of the Pacific. Often, considerations of new investment projects have to be shelved when the availability of a suitable location for the investment cannot be determined because of lack of written records. In other instances have the rights on land been challenged after major investments, cf. for example the present crisis of the Bouganville mining project in Papua New Guinea. Land registration and land information systems (LIS), therefore, represent potentially very beneficial applications of information technology as a means of mobilizing land resources in the Pacific.

PNG

87. Since 1984 the Land Department of Papua New Guinea has been undertaking a land information system project. Specifications for the first phase of the system were finalized in 1985. In 1987 a new ICL computer system was installed to support this phase which concentrated on development of a textual LIS. The next stage was introduction of graphical representation in the cadastral area. Eventually, it is planned that information will be drawn from various ministries so that all information relating to a land parcel will exist in a central data base available to the public administration as a whole.

Western Samoa

88. In Western Samoa a less ambitious Land Resource Planning Study was concluded in November 1989. This study has over a period of six months produced three sets of 1:50,000 scale maps of Western Samoa covering:

- Current land use
- Soils - soil quality
- Land capability.

89. The maps are based on digitized data on land topography; transport, drainage and other technical infrastructures; cadastral information; land use (crops, forest, etc.); and soil quality based on collection and laboratory analysis (in New Zealand) of soil samples covering a nation-wide sampling grid.

90. The data base, that was created through the project, can be used to extract and present information in a multitude of ways and formats for planning purposes.

Other IT applications Population register in Fiji

91. The Government Computer Services Centre in Fiji has recently computerized most of the country's birth records. Initially, all records for children up to six years of age were automated in order to serve the practical need for reissuing of birth certificates in connection with the children's entrance into the primary school system. Traditionally this process was cumbersome and took long time as it had to be based on manual records. Subsequently, the centre has automated a considerably larger part of the records by working backwards through the manual records. Eventually, the Government will have a complete, computerized population register which can serve as a common data base for numerous administrative and planning applications.

Personnel information systems

92. Many IDCs recognize that improved manpower planning and development are critical requisites for a better functioning public sector. At the same time it is realized that improved personnel information systems are necessary if this objective is to be achieved.

93. With a few exceptions only limited development, however, has until now taken place in this area. One example is Papua New Guinea. Here, the Government Computer Centre and the Department of Personnel Management have worked for several years on the development of a comprehensive on-line personnel information system linked to and updated from the payroll application. Eventually, the system, now approaching operational status, will support manpower planning and development, and administrative functions in both the central government agencies and the various ministries.

94. In St. Vincent and the Grenadines a first phase of an administrative reform programme has focussed on manpower issues in the public sector. In this connection it has been proposed to establish a human resource information system for the public service which would be implemented on the computer system of the central data processing department. However, so far no concrete steps have been taken.

Office automation

95. During the later years microcomputers have proliferated the public sector in most IDCs. A majority of these computers have been introduced in connection with aid projects as stand-alone systems with word processing as

the dominant application and spreadsheet applications as the second most common use of microcomputers.

96. There are few examples of more comprehensive information systems based on microcomputers. Most multi-workstation systems have evolved around a central computer system such as the government accounting system in Fiji, which uses workstations connected to a mainframe computer at the Government EDP Services, or the provincial financial management system in Papua New Guinea, where a minicomputer with workstations is installed in each province. When microcomputers have been networked the purpose has normally been facility sharing, e.g. sharing of a printer, between more workstations, and to create an integrated information system.

3.2. Regional Information Systems

97. Regional solutions are necessary to overcome many of the problems of the IDCs. Regional-level information systems utilizing computers and telecommunications are essentials in this connection. A number of such systems have already been developed and are operational; others are being planned. Developments in the Caribbean

Library and documentation systems

98. Library and documentation systems were among the first regional information systems. Such systems have generally been developed in response to the mandates of regional intergovernmental bodies, and to requirements of the membership of non-governmental organizations both in the Pacific and the Caribbean. The developments in the Caribbean have been particularly extensive in this respect; here, efforts to establish regional bibliographical information systems started in the early 1970s.

Stimulated by regional bodies

99. A large number of intergovernmental and non-governmental organizations operate in the Caribbean, such as: Caribbean Development and Co-operation Committee (CDCC), Caribbean Community (CARICOM) with secretariat, Caribbean Development Bank (CDB), Organization of Eastern Caribbean States (OECS) with secretariat, United Nations Economic Commission for Latin America and the Caribbean (UNECLAC), University of the West Indies (UWI), Caribbean Association of Industry and Commerce (CAIC), and Association for Caribbean Transformation (ACT); the last organization functions in the area of agriculture.

Information systems in priority areas

100. These organizations have been instrumental in establishing a number of regional information systems reflecting priority development areas as defined by the governments and members of the organizations:

-Agriculture

Systems include the Caribbean Information System for the Agricultural Sciences (CAGRIS), which is a bibliographic system; the Caribbean Agricultural Research and Development Institute Literature Service (CARDILS), also a bibliographic system; and Association for Caribbean Transformation Agricultural Information System (AIS), which contains quantitative data.

Other systems are being planned in this area including a Fisheries Information System, and a Production and Marketing Information System (PROMIS).

-Trade

In this area a Caribbean Trade Information System (CARTIS) comprising bibliographic, textual, and quantitative data, and a Caribbean Information Network (CBIN), which contains quantitative data, have been developed. A market intelligence system is being planned.

-Socio-economic Planning

Here, a Caribbean Information System for Economic and Social Planning (CARISPLAN) with bibliographic and textual data has been developed.

-Industry

Two systems, a Caribbean Patents Information System (CARPIN) and a Caribbean Technological Consultancy Service (CTCS), are operational in this area. CARPIN is primarily a bibliographic database, while CTCS contains quantitative data.

Two more systems, CARSTIN Technology Transfer Support Information System and CARSTIN Information System for Small-scale Industry, are being planned in this area.

-Energy

In this area a Caribbean Energy Information System (CEIS) has been established. The system contains bibliographical, textual and quantitative information.

-Banking and Finance

An Eastern Caribbean Central Bank Debt Management Recording System has been established. The system contains textual and quantitative data.

-Disaster Preparedness

A bibliographic Disaster Preparedness Information System (DPP) is operational, cf. also below regarding a geo-referenced system in this area.

101. Other systems are under development or being contemplated in the areas of health, education, law (in particular marine legislation), tourism and environment.

Influencing national IT developments

102. These regional information systems are generally connected into national focal points, and thus national information systems, in the individual countries. As the regional systems all are computerized, or include plans for computerization, they more or less inevitably lead to the introduction of IT at the national focal points. The microcomputer version of UNESCO's library software CDS/ISIS has been an important tool in this connection.

Information systems strategy

103. In early 1987 it was felt that some kind of co-ordinating framework would be needed for the further development and operation of the growing number of regional information systems in the Caribbean. A consultancy study which aimed at defining a regional information system strategy for the

Caribbean to the year 2000 was undertaken for the Caribbean Development and Co-operation Committee and the Caribbean Community with financial assistance of the International Development Research Centre (IDRC), Canada, see reference xxx. After consultations with all member governments and discussion at an expert group meeting in May 1987, the strategy was approved by CDCC at its tenth session in September/October 1987.

Co-ordinating mechanism

104. At the same time it was decided to set up a Consultative Committee on Regional Information Systems under CDCC and the CARICOM Council of Ministers. The Consultative Committee has until now held one meeting; a second meeting will be held in 1990. A practical problem in making this mechanism function is the limited staff resources which are available; both the Secretary and the Chairman of the Committee have, in addition to the Committee work, full-time jobs in their respective organizations (ECLAC and CARICOM).

DCIS

105. The Organization of Eastern Caribbean States and UNDP are presently developing a Development Cooperation Information System (DCIS) which after a development period of two years and an investment of US\$ 300,000 is operational in a test version. The system is implemented on a microcomputer and comprises a central data base with information about more than 3000 development projects in the Caribbean. The data base models the UNDP framework of development cooperation.

106. The main purpose of the system is information retrieval. It can in this connection produce detailed project listings corresponding to UNDP's Development Cooperation Reports. The system also flexible information search and retrieval on an ad hoc basis.

107. The system will be used by development planners at OECS and its member countries, and by donor organizations. It is presently being introduced on a pilot basis in the British Virgin Islands, Barbados, Dominica, Grenada and St. Lucia.

Operational-level information systems EIS

108. In the Caribbean a regional Emergency Information System (EIS) is under development as part of a Natural Hazards Project (NHP) of the Organization of American States (OAS). The system is now being tested in six OAS member countries. It comprises a geo-referenced database with information about natural resources, natural hazards, population, infrastructure, etc. The system is being implemented on microcomputers.

109. In the shorter term, the system is intended to support relief coordination and delivery, and contingency planning, at the regional level in connection with natural disasters, in particular hurricanes. In the longer term the system, when fully implemented also at the national level, is expected to become a powerful tool of development planning in a broader sense in the participating countries.

Forum Fisheries Agency

110. The Forum Fisheries Agency (FFA) in Honiara, Solomon Islands, is a common applied research organization for the island states of the South Pacific. The research is being used to formulate fisheries policies for the

member states and as a basis for their negotiations with overseas fishing fleets operating in the South Pacific. FFA thus plays a key role in the South Pacific IDCs' administration of their vast extended economic zones.

111. A computer-based information system is an integral part of FFA. The agency monitors as part of its work the actual fisheries in the South Pacific. It maintains in this connection a register of vessels operating in the Pacific with a description of their individual "standing", which can be "good" or "bad". FFA receives log-sheet information from each vessel including data on their catch, which is summarized and registered in a log-sheets data base. The reporting is inter alia done via telex. The catch data are used for economic analyses.

112. Ministries of Fisheries in the member states have access to the central information system in Honiara. FFA has in this connection specified standardized hardware and software to be used at the national level. Access via telecommunications is available. The FFA information system is also linked to and exchanges data with a computer-based information system operated by the Tuna and Billfish Assessment Programme of the South Pacific Commission in Noumea.

113. FFA, and the member countries, are interested in monitoring the movements of the vessels, to determine whether they fish inside zones where they have paid a licensing fee. In this connection it has been suggested to place registration equipment on board each vessel (basically a satellite navigation unit) which would store the position of the vessel at regular intervals and in such a way that the data can be accessed from FFA by means of radio equipment linked to its information system.

114. The FFA system is an example where the use of information technology constitutes the only feasible way in which a critical IDC problem could be solved. The system is now being copied in the Caribbean where the Organization of Eastern Caribbean states (OECS) in 1985 decided to establish an OECS Fisheries Unit modeled after FFA. The new unit has been located in St. Vincent. Also here one of the stated objectives is to establish and maintain a data and information management capability.

Economic data base for the Pacific

115. Recently the South Pacific Commission (SPC), Australia National University (ANA), the South Pacific Economic Commission (SPEC), and United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) have agreed to establish and cooperate about a regional economic data base covering the IDCs of the Pacific. SPC will implement the data base which will contain statistical

data from these countries and the participating organizations. The purpose is to provide economic analyses of the performance of each IDC. It is intended to make these analyses available to the countries, and to use them as a basis for technical assistance to the IDCs.

Population data base

116. United Nations Fund for Population Activities (UNFPA) has since 1979 cooperated with SPC, University of South Pacific (USP), and ESCAP about population data. UNFPA had inter alia funded a population group at SPC comprising a team leader and 3 staff members. The first phase had concentrated on data collection. A second phase is now being planned; the emphasis would here shift towards policy support to the IDCs, and it was the intention to transfer gradually the responsibility for the data collection to ESCAP. There are at the present no plans for making the data directly available to the IDCs.

Distance education

117. Both the University of the West Indies and the University of South Pacific (USP) conduct distance education programmes via telecommunications. USP has operated this programme based on a satellite network since 1985. The technical facilities include a central studio at USP and local studios at the University's extension centres in the participating countries, in addition to satellite ground stations at each site. The network uses a geostationary INTELSAT satellite on which a service segment has been made available to the University free of charge under the auspices of INTELSAT project SHARE. The countries which are using the system have agreed to lease the necessary equipment at their respective ground stations to the University for a nominal fee. The present funding covers operations until the end of September 1990.

118. The programme comprises first of all teaching of tutorials from the central studio to students at the extension centres, with direct teacher-student interaction during each session. The system also makes it possible for senior lecturers at the central site to assist less experienced lecturers at the extension centres.

119. Five countries are presently participating in the programme: Cook Islands, Fiji, Solomon Islands, Tonga and Vanuatu. Initially there were six participating countries; the link to Kiribati, however, was disconnected in January 1989 when the Kiribati Government increased its fee for lease of ground facilities by a factor 50.

120. The communication is in the present version of the system voice-based, supplemented by facsimile connections for exchange of written material. Plans are underway to expand the services to sub-centres in the participating countries. Electronic mail is planned to supplement the existing facsimile facilities in 1990. Global linkages and video transmission are being studied.

3.3. Inter-regional and Global Developments

121. A limited number of information system projects and other IT developments of relevance to the IDCs are taking place at the inter-regional or global level.

ASYCUDA

122. Nine OECS countries in the Caribbean are presently implementing an Automated SYSTEM for CUStoms Data (ASYCUDA) developed by UNCTAD in Geneva, see ref. 9. It is expected that the introduction of system, due to the resulting better and more systematic valuation, among other things will lead to an average 20% increase in customs revenues in the participating countries. As customs revenues generally constitute 60% or more of total Government revenues in these countries, the financial impact of this IT application will be considerable.

123. The ASYCUDA system and its implementation in nine Caribbean countries were mentioned earlier, see section 2.3. UNDP has recently approved funding of a similar ASYCUDA project for Asia and the Pacific. That project will also involve the setting up of a regional support function to facilitate installation of ASYCUDA in up to ten Asian and Pacific countries.

124. ASYCUDA is a computer-based support system for customs administration. The system uses the international ISO product and procedure codes for trade transactions, and supports the EDI (Electronic Data Interchange) system, which together have emerged as the world standard classification system for international trade. ASYCUDA is implemented in three languages: Spanish, French, and English.

125. ASYCUDA has been designed to achieve two objectives: to bring about better management of Government finances through an institutional strengthening of Customs, which are for the most part one of the main sources of public revenues in developing countries, and to provide a reliable source of information on external trade. More specifically, the purpose of the system is to:

reduce the administrative costs of external trade control activities and, consequently, the price of imported and exported goods, through simplification and rationalization of import and export customs clearance procedures;

provide Government with tools to bring about a more efficient and effective application of external trade regulations and, therefore, of custom tariffs;

establish an information system for control and monitoring of external trade activities through the production of accurate, timely statistics.

126. The project group at the OECS Secretariat estimates, as mentioned earlier, that introduction of the system, in addition to productivity improvements and other direct and indirect benefits, through the resulting more systematic valuation of imported goods, on average will increase custom revenues by 20%.

PSPMIS

127. The Department of Technical Co-operation for Development, UN Headquarters, is presently developing a preliminary design for an integrated Public Sector Planning and Management Information System (PSPMIS) for LDCs. It is the intention to develop and implement the system based on this initial work during the coming years. The proposed PSPMIS will aim to improve economic planning in LDCs, and should link the planning process to the preparation of the annual development and recurrent budgets, and to public expenditure monitoring and control.

128. The advantage of the PSPMIS approach compared to existing computerized planning support systems is its proposed integrated nature. While the existing systems all have focussed on important specific management issues such as project monitoring or recording of external capital assistance flows, they do not concentrate on these issues in an integrated fashion, especially in relation to other public finance variables, neither do they address the issues within a defined, coherent macro-economic and sectoral framework. The PSPMIS is assumed to overcome these shortcomings by linking specific sub-modules within a consistent and interrelated structure.

129. Assuming that the PSPMIS is developed as intended it would provide a valuable and needed tool for many IDCs.

Debt monitoring and financial analysis

130. UNCTAD has also developed a Debt Monitoring and Financial Analysis System (DMFAS) which has been implemented on both mainframes and microcomputers. The system supports the following main functions:

- Debt registration and recording of loans;
- Debt transaction accounting;
- Macro-economic modeling and sensitivity analyses.

131. The system includes a number of on-line facilities including flexible report preparation and updating facilities. As the system can operate on a microcomputer it is well suited for use in an IDC.

IV. MAJOR ISSUES

Large gap between potential and achievements

132. Considerable differences exist, as described in Chapter III, between the extent and level of computerization in the IDCs, and the character and quality of the resulting information systems, and thus between their contribution to the national development process. In all countries there is, however, a large gap between the potential benefits of modern information technology as described in Chapter II and what has until now been achieved.

Areas of discussion

133. The present chapter seeks to analyze and discuss the underlying reasons for this situation. It is natural to divide the discussion into four areas:

- The data that are available for creating improved information systems
- The general conditions of computerization and utilization of information in the IDCs
- The way in which information technology is being introduced into the IDCs
- The role of international aid

134. The chapter is organized into four sections covering these areas.

4.1. Availability of Data

135. Data is the raw material of information, which again is the basis for decision-making. Availability of data is thus a fundamental requisite both for the innovation process of development and for the implementation of development programmes and projects, see Section 2.1. Availability of relevant data, therefore, is a first requirement for improving the decision-making capacity of the IDCs.

136. The data issues are discussed in the following under four headings:

- Development planning
- Statistics
- Implementation and operations
- Organizational issues

Development Planning

Focus on planning, not on implementation

137. The most systematic efforts aimed at improving data and information availability for development planning and management in the IDCs have focussed on elements of the innovation process of development rather than on plan implementation. This might be one of the reasons for the fact that most IDCs appear to be better planners than practical implementors of the plans. In St. Vincent and the Grenadines, for example, less than 65% of the yearly investment budget is used.

138. The regional bibliographic information systems in the Caribbean represent one such more comprehensive effort. Several of those systems aim at

making research results in priority areas available to the Caribbean community, inter alia to provide knowledge about relevant technological developments.

Gaps in data bases and communication

139. Despite the number of information systems, that have been developed to support planning in the IDCs by making outside information available to these countries and their intergovernmental bodies, there are major gaps in the availability of relevant data. While the Caribbean countries are clearly the best served in this respect, they still lack access to relevant information in several identified priority areas of development, such as environment, tourism and medicine. The institutional framework for communicating information to the users is also primarily functioning at the regional level. The picture in the Pacific is one of less developed information systems, in particular in regard to communication links between the regional organizations, where the information is located, and the potential users in the countries.

Two types of development

140. In discussing planning and development, and the related data and information needs, it should be realized that the innovation process of development comprises two elements:

- "Quantum leaps", where something, fundamentally new is created, i.e. development takes place on the basis of an "invention", which in the case of an IDC normally originates from abroad;
- "Gradual" developments, where innovation and progress take place through experience gained via learning-by-doing in an existing activity area, and where data and information, therefore, must stem from that area.

141. While many of the regional information systems described in Chapter III have been created to support the "quantum leap" type of development, most development in reality probably originates from the second, less spectacular type of innovation process, which takes place in almost any activity area. One example is institution building, an important part of many development activities; most institution building is a time-consuming process, where the necessary experience is build up over a longer learning period.

Lack of information systems support to learning-by-doing processes

142. To support a learning-by-doing development process, data and information systems must reflect activities in the IDCs directly. This is necessary to make it possible for development planners and decision makers to analyze and evaluate results and activity performance, and thus give input to further improvements. Operational-level regional information systems, such as the described Forum Fisheries Agency information system in the Pacific and the Emergency Information System (EIS) in the Caribbean, serve this development purpose, in addition to their primary operational tasks. There are, however, very few systems of this nature.

Statistics

National statistical systems

143. National statistics is another area which aims at supporting the analysis and planning activities related to the learning-by-doing part of innovation.

144. However, there is widespread criticism of the statistics organizations in many IDCs both in the Caribbean and the Pacific. It is often argued that they do not produce the relevant information for development planning. And that they do generally not want to engage in analysis and interpretation of statistical data, and thus do not participate in the actual planning process.

A biased starting point after independence

145. Many of the statistical organizations in the IDCs have, as pointed out earlier, had to build a statistical system from a starting point that first of all reflected pre-independence links to former capitals and was biased towards serving those links, and e.g. lacked basic population and vital statistics.

Focus on population data

146. After independence it was thus natural to concentrate development assistance in the area of statistics on some of the commonly weak fields, in particular population data and vital statistics, that were also perceived to be of major importance to the donor community. Once this focus on population data had been established and was supported by a strong organizational setup in the international community, cf. e.g. UNFPA and the population groups at ESCAP, USP, etc., it was difficult to change direction and address other areas of statistics.

Need to develop other areas

147. While further development and assistance are useful in the area of population and vital statistics, there is a dire need for statistical improvements in other areas of development decisions: employment, tourism, housing, health, education, business development, etc. In these areas statistical data are often fragmented, and no systematic procedures for updating and maintenance of a statistical data base have been established. Generally, data sources have not been developed in those areas, e.g. reporting from the village level. Archiving of data is also a common problem.

Lack of analytical data

148. There is a common need for developing better analytical information, and capabilities, in the IDCs. One area of growing interest is, as mentioned earlier, the development of new service industries. Most IDCs have, however, very little information about the development impact of such industries, and would inter alia be interested in systematic data on the value added produced by them, e.g. to guide decisions on promotional measures by the Governments.

149. In the public sector there is a similar need for cost/benefit analyses, e.g. in regard to investments in health and education.

National accounts

150. National accounts represent another area, where outside influences to a high degree have determined the development of statistics in the IDCs. Many

IDCs have been forced to concentrate a major part of their internal statistical resources on building a statistical system which can produce reliable national accounts required by the major donors. While providing an indicator of the level of economic development in a country, national accounts do not support decision-making at the programme or project level and are of limited practical use in the day-to-day functioning of the government apparatus.

Need to refocus statistical systems

151. Against this background, there is widespread need to refocus the statistical efforts and capabilities of the IDCs to produce more and better ad hoc subject-matter-specific statistics which can reflect the particular problems of the individual countries in more detail. These problems, which obviously vary from country to country, relate to areas such as land utilization, exploration of natural resources, business development, trade (in-country, regional, international), transport, energy programmes, technology transfer, employment, migration, taxation, education, health, etc.

Need for new value-added services

152. The statistical offices must in this connection also engage themselves more directly in the evaluation and interpretation of statistical information, e.g. to produce regularly up-to-date indicators of development trends in priority areas. There is thus a need for new value-added services and products from the statistical offices. Such services and products will require a more sophisticated use of computers by these offices than the present record handling routines.

Need to develop 'delivery systems' of statistics

153. The fact that most statistics produced in the IDCs is still communicated to the potential users in the form of statistical publications limits severely the usability, and therefore the use, of statistical information. Until computerized statistical data are made generally available to end users either in a down-loaded format for use on a microcomputer, or as a statistical data base accessible through telecommunications, so that the data are immediately available and can be used in an integrated way in the daily work whenever needed, this situation is likely to remain.

Need for operational-level data bases

154. Ad hoc production of good subject matter statistics, however, is directly linked to the availability of reliable, up-to-date, operational-level data in the particular subject matter area. Most often, data bases at the operational level are either non-existing or weak, and generally not consolidated at the national level.

155. There is, therefore, in many IDCs a need to establish or improve operational-level data bases in priority areas. While the important problem areas, and thus priorities, vary from country to country the need for a selective, systematic improvement of operational data is a common need. Therefore, a general approach to achieve this improvement would be advantageous.

Implementation and Operations

Plan implementation

156. The discussion of operational-level information systems leads to the second part of development planning and management, namely that of plan implementation, which again is directly linked to the day-to-day functioning of the public sector.

157. The most effective information systems have here been established where top-management interest and larger scale administrative system considerations, e.g. related to the existence of a central computer installation, have stimulated and guided the development and implementation of operational-level information systems. The computerized government accounting system in Fiji is an example. Successful operational-level information systems have also been established through regional initiatives. The FFA information system in the Pacific and EIS in the Caribbean are two examples.

Few successful operational-level information systems

158. Generally, however, there are very few successful, operational-level public sector information systems in the IDCs. The approach to computerization has generally been 'top-down' with the first computers being installed at central statistical offices, planning agencies, ministries of finance, etc. which in most cases rely on secondary data from other parts of the government sector. The 'data base' of computerization has as a result often remained manual, and computerization developments have stayed isolated from the day-to-day operations of government.

Organizational Issues

Internal barriers

159. The combination of manual data and a lack of traditions of communicating written records between ministries, which characterize many IDCs, often means that relevant data are simply not available for decision making. A few quotes from discussions with government officials in the IDCs illustrate the situation:

"....the existing records on roads are very sparse. We have an idea, but no facts....The Department (of Transport) lacks information on accidents. The police records such data but do not make them available...."

"....We (a major government department) have our own (accounting) figures, Treasury have their own figures. The two sets are not the same. We would like access to Treasury's figures, but they are secret....".

Unused data sources

160. Lack of skills in the IDCs and the derived need for training and human resource development are the most frequently identified, critical development issues by government officials in those countries. Already existing data sources in the countries are, however, not used to define the problems in practical operational terms.

161. The expatriates who work in an IDC represent a picture of the knowledge and expertise that the country needs, but does not have. The Labor Departments in most countries maintain records on work permits for expatriate workers.

These work permits could be used as a source of information about the needed skills, and could therefore provide valuable input to training institutions, manpower planners, etc. However, until now such use of the data has not taken place.

Microcomputers have supported individuals not organizations

162. The later years' microcomputer developments in the IDCs have not changed this picture. Generally, the introduction of microcomputers has aimed at improving clerical and professional productivity as tools for individuals, not at establishing information systems that reflect and support organizational objectives.

New organizational initiatives needed

163. The data issues described above are institutional, not technical issues. Better utilization of regional data bases will require new organizational solutions at the national level. Improvement of statistics is first of all a question of changed priorities and a different organization of statistical work both at the regional and national levels. Development of regional information systems, such as the FFA information system and EIS, requires in the area in question political and practical regional cooperation and the establishment of an appropriate institutional framework with the necessary funding and facilities. The development of operational-level information systems at the national level requires political and management backing, a consistent computerization strategy, and organizational development.

Development of common tools

164. A number of problem areas are common and have priority in several countries. Examples are land registration in the Pacific, employment, business development, tourism, migration, economic and financial management, development planning and management, health, and education. There is in such areas a case for development of standard approaches and tools, e.g. software, where adequate solutions do not exist, and for expanding the utilization of existing solutions where these already have been developed.

Development of framework for information transfer

165. It is also necessary to further improve the technical and institutional infrastructure for information transfer to the IDCs.

166. Technical improvements might for instance comprise providing telecommunications access to already existing data bases, provision of copies of existing data bases, e.g. on mass storage media, for downloading to microcomputers at the national level, establishment of new data bases on topics of particular relevance to the island countries, provision of linkages into existing computer and knowledge networks, and participation in electronic conferencing and teaching networks.

167. Institutional improvements would for example comprise legal and financial arrangements to utilize remote data bases and other services, arrangements for operating and maintaining possible new data bases, and building up of the necessary competence in the island countries to utilize outside information.

168. For practical and cost reasons such technical and institutional improvements will require international assistance and a regional or global approach.

4.2. Conditions of Information Systems Development and Computerization

169. The general conditions, under which information systems development and computerization must take place in the IDCs, are determined by human, social, institutional, legal, economic, political, commercial and technical factors in those countries. They are also influenced by regional institutions and their policies, and by the donors.

170. The present section discusses within this context the general obstacles to realization of the potential of modern information technology as a tool for developing effective information systems in the IDCs. The issues are discussed under six headings:

- Information systems development
- Barriers to organizational development
- Human resources
- Technical environment
- Legal issues
- International cooperation

Information Systems Development

Lack of 'information culture'

171. In many IDCs there are no traditions for collection, processing, storage and use of formalized information, cf. e.g. the lack of land records in the Pacific and the importance of personal and family relations in many IDCs. Political and managerial decisions have normally been made on the basis of informal information which is only known to the decision maker.

Lack of interest in MIS-applications

172. The concept of information and the role of information systems, as defined in the developed countries, are therefore not well understood at the top Government level in the IDCs. This means in particular that MIS applications are not easily appreciated by the government decision makers: "There is very little interest among the users and management for this type of applications" (comment by computer centre manager during discussion of reporting of management information from a government accounting system).

No traditions for allocating resources to information

173. This lack of 'information culture' also means that there are no traditions for allocating economic and other resources to information in the IDCs. This is very clearly illustrated by the problems of modernization and staffing some of the central computer installations in the IDCs are presently facing, and by the problems of financing computer operations from the recurrent budgets when the initial aid-funded development and implementation of computer installations and information systems are concluded.

Lack of IT policies

174. Generally, the IDCs have not formulated coherent strategies of information systems development and computerization, which are requisite for a systematic and dynamic utilization of the technology. They have consequently not identified key areas for the introduction of information technology in the public sector, and priorities have not been defined for the development of

computerized information systems. Some of the direct implications of this situation are:

- That computerized information systems are often being designed and implemented on the basis of incomplete or wrong assumptions;
- That required data sources and related information systems frequently are not in place when new computer applications needing them are being developed;
- That scarce systems development resources are not being used for the most important tasks;
- That there are often high costs and limited achievements from computerization efforts.

Lack of coordination sectoral approach

175. In most IDCs computerization has thus been pursued ministry by ministry on a sectoral basis with no interministerial overall plan or co-ordination. While this approach has some advantages when the first steps into computing are being taken, it tends in the longer run to have two negative implications:

- It leads to a proliferation of different routine data processing systems that basically solve the same problem in different departments, e.g. accounting, budgeting and payroll applications, inventory management and word processing.
- From an overall point of view this means wasting critical development resources on duplicated systems development and maintenance, resulting in slower progress and higher costs of computerization.
- It implies that computerized integration of data from different sectors of the government, needed for development management purposes and overall decision-making becomes virtually impossible because of different numbering systems for the same entities, different classification schemes, and incompatible hardware and software systems.
- This should be seen in relation to the fact that supporting socio-economic planning and development (which in many cases requires such integration) is generally stated as a primary objective of using the technology in the IDCs.

Organizational impacts overlooked

176. The IDCs do not see the public sector as an interrelated set of information systems reflecting its organizational structure and functions. They, therefore, normally fail to realize that the introduction of modern information technology, if it is to be successful, must be closely linked to organizational development, and often will require administrative rethinking and investments in organizational change, systems design and human resources.

177. A contributing factor to this lack of focus on the organizational implications of computerization might be that many IDCs until now have paid relatively little attention to the practical functioning of the administrative apparatus of the public sector. In countries, which recently have gained independence, the attention of politicians and top-level civil servants has

through the first period of independence naturally been on issues of development financing and the 'power structure' (i.e. authority to make decisions) of the public sector rather than on the administration per se.

Focus on hardware

178. Another result of this lack of appreciation of the information systems aspects of computerization has been that policy-level focus in connection with computerization developments (if it has existed) almost invariably has been on computer hardware and vendor relations, with no or limited attention paid to software, systems development and human resources. This policy-level interest in only one aspect of computerization, and generally the least important one, has in some IDCs certainly been counterproductive in regard to establishing relevant priorities for the utilization of the technology.

Bureaucratic decision processes

179. A derived, general consequence of the prevailing emphasis on the power structure rather than the functions of the public sector is a high, and continuously growing, complexity of its decision processes, e.g. illustrated by the lengthy approval procedures for technical assistance and development projects in many IDCs. This has also had a negative impact on computerization developments in the public sector.

180. Slow and cumbersome decision processes and bureaucratic procedures make technical/economic decisions in the dynamic information technology field extremely difficult. And probably more seriously tend to preserve the existing procedures and systems, making more fundamental administrative changes and developments virtually impossible. The result is that information technology, rather than being an agent of innovation and change, tends to become a tool for automating the status quo.

Three issues

181. The basic problem is that planning and implementation of the economic, technological and social development programmes that are now being undertaken by the IDCs require formal information systems, and utilization of information technology. The critical 'information culture' issues are then:

- To convince top government decision makers that economic and social development requires effective computer-based information systems, and that these systems are linked to organizational development
- To convince the same decision makers that utilization of information technology requires a coherent IT strategy for the government sector as a whole, and that computerization requires human, technical and economic resources.
- To create conditions in connection with development and operation of IT based information systems which will effectively bridge the gap between the decision makers and those who have the information.

Barriers to Organizational Development

Resistance to change

182. The introduction of modern information technology implies organizational development. All organizational systems, however, resist change. This is also the case in the IDCs. A project coordinator for an administrative development

project in a small island developing country formulated the problems in the following way: "The obstacles to organizational change are psychological rather than practical.... the organizational climate (for computerization) is not right; before that is changed, investments in information technology are doomed to fail".

Existing power structures

183. The traditional manual systems of government have created their own power structures. The manual systems often mean that citizens or private companies, in order to get any action from the Government, will have to contact a senior civil servant or politician directly. This situation places key individuals in

positions of power they are not likely to give up without getting something in return. The above-mentioned project coordinator formulated the problem in the following way: "A lot of trade-offs must be made before any real administrative reforms can take place..... it is humanly difficult to give up personal privileges and advantages for a non-defined, potential common good".

184. Often, there is instinctive resistance among decision makers against development plans which are generally prepared with major outside assistance. This hampers plan implementation. Close social and kinship ties sometimes make it difficult to formulate and apply policies on purely technical grounds. In small IDCs this can result in serious problems in regard to policy making, and administrative and management processes for reasons distinct from those arising out of mere diseconomies of scale.

Conflicts between formal organizations and traditional ways

185. Mission reports prepared in connection with UNDP's new Management Development Programme in some of the Pacific IDCs have pointed out that the hierarchical organizational structures of government that have been imposed on the island developing countries after independence do not fit the islanders' traditional consultative and informal ways of making decisions. They, therefore, do not work very well in particular in regard to coordination of activities between different departments and agencies. The general remedy proposed is introduction of a resource management approach that will ensure high-level coordination of decisions across the government sector as a whole.

Human Resources

Systems development resources and technical expertise

186. The lack of skilled resources in the IDCs has been discussed earlier, cf. Chapter II. It obviously influences IT developments in those countries. There is a genuine shortage of both technology-oriented and user expertise necessary to exploit information technology to its full potential in all IDCs. Capable information and systems analysts, programmers, computer operations staff, and experienced users in the various potential application areas, are obviously in short supply in these countries.

187. In some IDCs the situation of the public sector is worsened by factors which at least in principle are within the control of the Government. Some of these factors are:

- The salary systems of the public-sector which are generally designed to reflect traditional lifelong civil service careers and the related job security. This means low entry-level salaries with relatively small automatic annual increases. Higher salaries normally are related to reaching management positions.

- The general low status of technical expertise in the public sector which characterizes some IDCs, for example reflecting the traditions of previous colonial civil services.
- The widely applied practice that career development in the public sector, in regard to obtaining a real salary increase, can only take place in connection with transfer to another position (which is classified with a higher management responsibility).
- Slow decision processes in regard to the establishment and classification of new positions in the public sector.
- Slow and cumbersome recruitment processes.

188. The result is that: (i) the salaries offered to computer professionals in the public sector are often unrealistically low compared to the salaries offered in the private sector or abroad; (ii) civil servants being trained for computer jobs after this training are often transferred to jobs that have nothing to do with their training, in order to provide them with a higher salary; and (iii) candidates who have been identified for a computer position have often found another job when the procedures for hiring him/her have been completed. The problems of competition for staff with the outside do not exist in all IDCs. They are particularly marked in IDCs where a viable private computer sector exists as in Fiji, Papua New Guinea and Barbados, or where migration to a metropolitan country is easy.

User training

181. A general lack of computer literacy in the IDCs hampers the use of already existing information systems, and prevents in many cases further development and more sophisticated use of such systems in the Government sector. There is a large need for more training in the computer field.

182. It is here important to note that such training to be effective must be closely linked to actual IT developments and the related organizational developments in the local environment. If such a linkage does not exist the training will take place in a vacuum, and there is a high risk that the efforts are wasted. The critical issue is, therefore, to establish and implement appropriate training programmes, that cover all relevant staff levels, in connection with each computerization project, and at the more general level as part of an overall computerization strategy.

Lack of analytical capacity

183. Lack of analytical capability is a special problem in regard to the use of information for planning and decision making purposes. Many islanders in professional and management positions in the public sector have no experience in working analytically with data. They, therefore, have difficulties both in working with MIS applications and in formulating requirements to such systems.

184. Supervised practice and systematic training are the traditional means of overcoming this problem. All MIS projects should, therefore, include a strong user training component on data analysis and interpretation.

185. While some of this training would be project specific, part of it would be of a more general nature. This provides a case for developing the latter part as a standard MIS training package to be made available to the IDCs on a common basis.

Potential role of expert systems

186. In this connection it might be noted that the use of expert systems, cf. also the earlier discussion in Chapter II, could be a new and sometime more effective way than training and traditional on-the-job support to address the problem of lack of analytical experience. A number of pilot projects indicate that expert systems probably represent the best way of passing on know-how yet devised. This passing on of experience points to their potential role in MIS developments in the IDCs. There is a need to explore this potential of expert systems through a more comprehensive MIS project in an IDC.

Lack of management capacity

187. Lack of management capacity is increasingly felt to be a serious problem in the IDCs, cf. e.g. UNDP's Management Development Programme. It is particularly serious in regard to IT developments because of the close linkage between organizational development and computerization, and because of the complexity of the technology transfer process in this area.

Dependence on expatriates

188. The lack of local expertise in the IDCs has as pointed out traditionally been overcome by use of expatriates who are functioning for shorter or longer periods in positions which require expertise or management capabilities not available at the national level. This has been very much the case in the computer field.

189. Most larger computerization projects in the IDCs have been initiated and implemented through international aid projects. The necessary technical expertise has to a large extent been provided through expatriates funded via these projects. Often some of the important users have also been expatriates functioning in key civil service positions on loan from the former metropolitan countries.

190. While this has meant that a number of IDCs in some areas have been able to enter into a fairly sophisticated level of computerization over a period of few years, this solution has resulted in a serious problem of continuity and vulnerability. For lack of local computer and user expertise, there is a grave risk that many of the current computerization achievements of the IDCs might be lost when the supporting aid programmes end.

Technical Environment

191. The technical environment of computerization comprises hardware and software vendors, systems development and consultancy companies, local power supply, telecommunications facilities, etc., which provide and support the operation of technical computer installations.

HW and SW vendors

192. Most IDCs are too small from a market point of view to allow local representation of more than at most a few of the major international hardware and software vendors. The best 'populated' in regard to vendor representation are Barbados and Fiji, but the vendor offices are also here small, with limited technical expertise available at the local level. The IDCs, therefore, must often rely on support from abroad, normally from a vendor office in the nearest metropolitan country (Australia, U.S., etc.).

193. The market is, however, growing, in particular in the microcomputer field, which means that more vendors will be represented in the IDCs during the coming years. As hardware and software support, including maintenance and upgrading, provided during the lifetime of a computer system is generally at least as important as the initial choice of hardware and software, the IDCs should, whenever they have a choice, choose vendors with local representation and maintenance organization. They, and the donors, have not always done so.

Systems developers and consultants

194. The local IDC markets for "soft services", such as application systems development and management consultancy, are relatively smaller and more fragmented than their hardware and software markets. One reason is that the public sector, which is the largest single market segment for systems development and management consultancies in many IDCs, in this area almost exclusively rely on international aid, and, therefore, most often on international system suppliers and consultants. In the private sector the biggest users of system suppliers and consultants are local subsidiaries of multinational companies. Also here there is a tendency to use outside consultants, namely those used by the mother company. Accounting is as a consequence the only area where a reasonable level of local expertise is more widely available in the IDCs.

195. This situation makes it important that the IDCs as much as possible base their computer-supported information systems on standard packages, where an outside source of support, maintenance and further development is clearly defined. They should only resort to 'tailor-made' solutions, where they themselves will have the practical responsibility for systems maintenance and development, when no other solution exists. This rule has also often been broken both by the IDCs and the donors.

Power supply

196. Generally, electric power supply is not a serious problem in the IDCs. Microcomputers require little power and can work in a normal office environment. In some cases it is necessary to provide voltage regulators and possibly an emergency power supply that can ensure an orderly systems shutdown in case of power failure. Larger installations (mainframes and minis) will normally require their own, more sophisticated power supply.

Telecommunications

197. The use of telecommunication based information systems represents as pointed out in Chapter II an important tool for overcoming the disadvantages of remoteness which characterize many IDCs. Major improvements have taken place during the later years in the technical facilities available to the IDCs in this area. In the Pacific these improvements have been stimulated by, and in many ways resulted from, through concerted efforts by the IDCs and the donors, such as the South Pacific Telecommunications Development Programme, which is located at SPEC. This programme has over a number of years resulted in vastly improved, satellite-based international telephone services in the Pacific. The programme is presently concerned with the provision of better telephone services to the outer islands. The eight outer islands in Tuvalu have for example now been linked into the central island through a new satellite service, that makes it possible to provide cost-effective telephone services to relatively small communities.

198. As mentioned in connection with the description of the remote distance teaching programme of the University of South Pacific there are, however, still considerable cost problems in establishing and operating

telecommunications based information systems. In the Pacific, for example, such systems have to be based on dedicated circuits which are very expensive in relation to the actual amounts of data exchanged. Until packet switching services have been established by the telecommunications authorities cost is going to prevent development in many areas, for example of value-added information services, which could be very beneficial to the IDCs. The regional organizations of IDCs have an important role in this connection in putting political pressure on the telecommunications authorities.

Legal Issues

199. Generally, there has until now been no discussion or consideration of legal issues in connection with the use of information technology in the IDCs. As computerization grows issues like privacy protection, responsibility for negative impacts of computer-supported decisions, copyright, etc., however, will have to be faced and dealt with also in the IDCs.

Need for privacy legislation

200. The most urgent problem in this connection is the lack of relevant privacy legislation in the IDCs. Fear for misuse of information are in some cases preventing obvious beneficial computer applications that could be established through exchange of already computerized data. Examples can for example be found in the statistical area. The discussion involved in establishing appropriate data and privacy legislation in the IDCs would in each of these clarify the real problems and provide a necessary framework for a further, more advanced exploitation of the technology.

International Cooperation

201. A large part of all outside development assistance to the IDCs is channelled through international and regional institutions. The development of information systems and the use of information technology, however, generally occur as an adjunct to other activities, cf. also below under Section 4.4, and often tend to serve the international bodies more than the individual countries. There is generally very little coordination between the activities of the various organizations. A large part of the assistance is provided through regional advisers and short-term consultancies, addressing specific immediate problems. The assistance has as a result often limited structural impact, and is generally not conducive to a more systematic utilization of information technology.

Primary information systems are often regional by nature

202. Primary information systems that support the substantive functions of government generally represent the largest value-added potential of computerization in the IDCs, cf. Section 2.3. In many areas such information systems, however, can not be established on a solely national basis, but will require international solutions. Examples are FFA's information system in the Pacific and the OECS' emergency information system in the Caribbean, and most of the bibliographic information systems that have been developed. Health and education are other areas where access to information outside the individual country can vastly improve the quality and level of services provided. A regional employment service has been suggested by ILO in the Pacific.

No systematic development

203. With exception of the area of bibliographic information systems in the Caribbean, however, no systematic development of regional information systems have taken place. Operational-level information systems, such as the system at

FFA, have generally emerged as an indirect consequence of political decisions about regional cooperation in a particular field, not as a result of a specific information systems development strategy. The establishment of such systems, therefore, has happened more or less haphazardly.

Global information systems programme needed

204. The international institutional framework necessary to explore the potential of modern information technology in the IDCs is, therefore, in reality lacking. There is a large need for a global information systems development programme for the IDCs, complemented by regional programmes, which can ensure development, implementation, and operation of a comprehensive set of global and regional infrastructural information systems to provide the necessary basis for development and implementation of primary information systems in the IDCs.

4.3. Application of Information Technology

205. The general conditions of information systems development and computerization described in the previous section influence to some degree the formulation and implementation of all computerization projects in the IDCs, including information technology elements in projects aimed at other purposes.

206. In addition, a number of more specific problems, that can vary greatly from country to country, impact computerization developments at the level of the individual project. This section discusses those problems under the following headings:

- Project formulation
- Project implementation
- System operations

Project Formulation

Underestimating need for institution building

207. Most administrative applications of computers have as pointed out organizational implications. Computerization projects, therefore, are often tantamount to institution building. However, as the organizational requirements and implications of computerization projects are generally overlooked, so are their institution-building aspects.

208. The result is that no provisions are made for handling these aspects, in particular that the time required for the computerization process is underestimated. Many projects consequently require unforeseen follow-up projects, or 'second or third phases' to ensure lasting results.

Underestimating requirements

209. The IDCs and the donors both tend to underestimate the resources required and the time needed in computerization projects. Two factors contribute to this seeming 'lack of realism' in the project formulation phase:

The earlier described focus on hardware rather than on software, data and organizational requirements and implications, when computerization projects are being defined. Often, the visible hardware part constitutes less than 30% of the total computerization costs. Generally, there is a tendency to overlook or grossly underestimate the 'other costs'.

Lack of professional technical expertise which can provide realistic estimates of the size of the development and implementation work involved in computerization projects. Technical expertise with sufficient experience to estimate the volume of systems work, and adequate knowledge of the practical application areas and their organizational environment, is often not available, or sought, when new computerization projects are being defined.

210. The result is projects based on unrealistic technical assumptions, which by default will cost more and take more time than budgeted, and which probably will achieve less than expected.

Too ambitious projects

211. There is a tendency to define computerization projects with a large gap between intentions and what can realistically be achieved taking into account the available technical resources, the organizational changes required, the available time frame, etc. Several factors seem to amplify each other:

Computer-related projects are often being initiated and designed by the young 'professional elite' of donors and IDCs who have little practical experience with the planning and implementation of computerization projects in an administrative environment.

The vendors tend to stress the potential rather than the problems of the technology.

Advanced utilization of information technology is often considered fashionable and prestigious by both IDCs and donors, meaning that projects with a high-tech content might be more easily approved than less ambitious projects.

Project implementation

Lack of management support

212. It is often pointed out that top-management support and active involvement is a key requisite for successful computerization projects. However, the prevailing lack of management focus on the practical functioning of the public sector in the IDCs discussed in Section 4.2 means that computerization projects, which are generally seen as purely technical matters, are seldom considered to have a direct bearing on the management level. The result is often a lack of management interest in, and consequently support of, computerization projects.

213. A contributing factor in this connection is the earlier described practice of frequent transfers of senior-level civil servants between various positions in the public sector, characterizing many IDCs. This means that the person(s) responsible for a project often change(s) during the project.

Weak project organizations

214. The lack of management support will normally reflect in a weak project organization. However, other factors are also contributing to ineffective project organizations:

Lack of practical project management experience in the public sector. Generally, the typical civil servant is more administrator than manager, and not well qualified to handle the complexity of a computerization project and the unforeseen problems that invariably occur in any project.

The general lack of qualified technical and user expertise, which makes it difficult to staff a project organization properly.

Difficulties in recruiting additional staff. The shortage of computerization expertise in the public sector is in many cases amplified by the practical difficulties which can face a project organization if it tries to hire qualified staff from the outside.

System Operations

Lack of budgetary provisions for operations

215. The strong dependence on external aid for financing computerization developments amplifies the distinction between the initial, primarily donor-funded investment in computer equipment and systems, and the subsequent funding of the operation of the equipment, which the government must cover through its recurrent budget. The latter is generally much tighter than the aid-supported development budget.

216. Against this background, there is a understandable tendency to underestimate the budgets required for operating and maintaining the computerized solutions after their implementation. It might be in this connection be mentioned that maintenance of applications software per year of operation typically will require 20% of the original software investment. Expressed in another way, during the first four years of operation, the government must expect and make budgetary provisions for systems and programming work corresponding to the total original systems effort, in addition to other operating costs. The governments very seldom do so, and computer applications consequently often degenerate and 'die' after a few years.

Need for continuing technical assistance

217. In defining and implementing computerization projects, there is a common tendency to overlook the fact that the underlying information technology is developing continuously and fast, and that the optimal technical solutions, therefore, are 'moving targets'. Computerized information systems as a consequence must continuously be updated and modernized in order to ensure that they continue serving their purpose.

218. This need for continuing technological updating and development is often overlooked, and the required economic resources and technical expertise for maintaining and updating the systems consequently not provided for.

4.4. The Role of International Aid

219. International aid has as pointed out played a major role, and in many cases been instrumental, in the introduction of information technology in the IDCs. This assistance has nevertheless not been without problems. The resulting dependence on expatriates, which was discussed in Section 4.2, is one example. The donor assistance has, however, also enhanced some of the inherent problems of computerization in the IDCs described above.

Project approach contributes to lack of coordination

220. The close linkage between computerization and development aid has for example contributed to the lack of coordination, which has characterized computerization developments in the IDCs. A large proportion of all assistance projects includes, as mentioned earlier, a computerization component. Most

often computer equipment acquired in connection with a project will remain in the country after the project is finished, and will eventually be used for other purposes with no direct relationship to the original project.

221. In the majority of development projects where computerization has been a part, the emphasis has been on 'subject matter' activities, not on information technology. Information technology developments have, as a consequence, been sector-oriented and fragmented between various government institutions. None of the donors seem to have assisted the IDCs in any systematic or comprehensive way in the IT-field across the public sector as a whole.

Problem of aid coordination

222. The problems faced by particularly the smaller IDC administrations in relating to a multiplicity of donors tend to magnify the above described coordination problems both at the national and regional levels.

223. The aid agencies should in this connection make special efforts to ensure co-ordination among themselves in defining and implementing their assistance programmes.

Focus on technology not on organization

224. Generally, there has been a tendency to view information technology as a subordinate tool of a purely technical nature. The special organizational and managerial problems of computerization have only attracted little attention. When aid has been provided to address the general conditions of computerization the emphasis has consequently been on establishing technical facilities and technical training.

225. On the donor side, the lack of focus on the management problems of computerization has in some cases meant that the selection of computer hardware and software has been dictated more by industry considerations in the donor country, than by, for example, compatibility considerations in the project country.

Institution building not supported

226. The introduction of modern information technology into an organization is an institution-building process. The way aid is provided from the donors does, however, often make such a process difficult. All aid agencies work in terms of a timing factor; projects have to be completed within a given, often tight time schedule. It is, however, very difficult to undertake institution-building projects under such a framework. The short-term project approach is further stimulated by many donor countries' tendency to favor emergency relief type of assistance which is easy to plan and manage, and which has high political visibility in the donor country.

227. In some IDCs this lack of support to institution building from the donor side is magnified by a colonial traditions where projects typically had to be small and inexpensive to get approval in capitals: "It was typical to ask for three trucks when a new garbage disposal system was actually needed".

V. ELEMENTS OF AN ACTION PLAN

Institutional and methodological barriers to IT developments

228. The development and implementation of well-functioning IT applications in the IDCs and their regional organizations are first of all prevented by non-technical barriers. The issues are first of all institutional and methodological, not technological. Lack of direction, coherency and consistency of IT developments are the main problems, in the individual countries, the international organizations, and the donor programmes.

229. While the particular conditions and problems of IT development obviously vary from country to country, the fundamental issues are the same. The solutions are, therefore, to a large extent common.

230. The issues relate to the conditions of computerization in the IDCs and the regional organizations, and to donor attitudes. Before those issues are resolved, the full potential of information technology in IDC development described at the beginning of this report cannot be realized.

231. Development and time will not make the issues go away and provide conducive conditions for an effective utilization of information technology in the IDCs. A conscious, systematic effort by the countries, their regional organizations, and the donors is needed.

232. The present chapter aims at identifying some of the critical elements of such an effort. The discussion is divided into four parts:

- National-level initiatives
- Regional-level initiatives
- Special initiatives
- Role of donors

233. Concrete recommendations for action are grouped under these four headings. The recommendations are numbered for easy reference.

5.1 National-level Elements

234. The key to successful computerization resides in many ways at the national level. Suitable local conditions and active policy and management support of IT developments are the first requisites of a successful application of information technology in the public sector. Without those requisites in place the value of regional-level systems and initiatives are limited.

235. National-level initiatives in an IT action programme are discussed under the following headings:

Defining an IT strategy - coordination of IT developments
Development of key data base systems

Human resource development programme

Legal framework

Defining an IT Strategy - Coordination of IT developments

236. The lack of strategy and coherency, that characterizes IT developments in most IDCs, is the key barrier to a more advanced utilization of information technology in those countries. It is also the primary reason why so many projects and investments in computerization have failed in the IDCs.

Need for national IT strategies

237. There is, therefore, in most IDCs a critical need to create an overall information systems and computerization strategy, in the following designated an IT strategy, that can provide the necessary guiding and coordinating framework for the government's planning and decision-making in this area, and for channelling outside assistance to national-level IT developments.

238. More specifically, an IT-strategy should:

Objectives:

Link IT developments to the national development plan, i.e. define the necessary policies and priorities for the utilization of IT in the public sector

Define policies regarding the development and utilization of IT resources (HW, SW, applications, systems development and programming expertise, etc.)

Define the institutional framework for implementing those policies, including the necessary coordination and standardization mechanisms

Define policies regarding user training and development

Define relations to the private sector in the IT field

Allocate the necessary economic resources in the government's investment and recurrent budgets

Common approach possible

239. While the work involved in developing an IT strategy will differ from one country to another depending on local circumstances, a number of common features are likely to remain. The process will, for example, normally require input of outside technical expertise, and must involve the key top management players in the government sector including the political level. At the technical level standardization issues will play a major role.

240. There is, therefore, a case for applying a common approach to the work, which would facilitate exchange of experience in this area between IDCs. In ESCAP's Government Computerization Programme it has for example been suggested to use structured high-level strategic workshops as a means of bringing key government officials together for an open discussion of IT developments across institutional divisions.

Recommendations

241. Against this background it is recommended:

- a) That all IDCs give the development of an IT strategy and the corresponding institutional framework for coordinating IT developments high priority

- b) That the IDCs use this IT strategy and the related institutional mechanisms as a policy framework within which external IT assistance should be provided
- c) That the relevant donors likewise give priority to the development of IT strategies and coordinating mechanisms in the IDCs
- d) That donors, when such strategies and mechanisms have been established, seek to provide their computerization assistance correspondingly, and if necessary adjust aid policies in this area.

Development of Key Data Base Systems

Need to develop national infrastructure of data bases

242. A central part of any long-term IT development plan will be the establishment of operational-level data bases, and the related applications, for the main activity areas of the public sector. These data bases will contain data about the basic 'entities' of government interest, such as land units, citizens, businesses, hospital patients, students, books in libraries, etc., and about internal 'entities', for example government employees, properties, buildings, etc.

243. The data bases reflect the content of the government's primary and secondary functions. From an user and application's point of view, they constitute the main practical means for establishing integration between various government functions.

244. The way data bases are established, and in some cases their mere existence, are thus often critical for realizing organizational productivity improvements and for producing new value-added services promised by the introduction of computers. It has earlier been pointed out that well-functioning data bases that are being updated and used in day-to-day operations are requisites for improving the statistical data for government planners.

Recommendations

245. It is, therefore, recommended:

Data bases in priority areas

That IDC governments in their IT strategies and plans give the establishment of computerized data bases in key areas, each with a set of integrated applications, high priority in their IT strategies and development plans

Operational-level on-line systems

- a) That those data bases are established in such a way that they directly support day-to-day operations and are maintained and updated by these operations
- b) That those applications and data bases, whenever possible, are designed and implemented as on-line systems
- c) That the donors give such data base developments high priority

- d) That the donors in this connection give special priority to data base and applications development in areas of common interest to the IDCs, such as land registration (in the Pacific) and personnel management (common)

Linkages to existing systems

That donors also give particular priority to the development of local 'counterpart systems' where regional-level data bases already exist.

Development of Statistical System

246. In the previous chapter it was pointed out that improved availability of data for planning purposes in many IDCs will require change and refocussing of their national statistical systems both at the technical and institutional levels.

Recommendations

247. More specifically it is recommended:

Shift towards ad hoc subject-matter statistics

That the statistical offices strengthen their capabilities to produce more and better ad hoc subject-matter-specific statistics that reflect the particular development problems of the individual countries in more detail, if necessary by reallocating resources from the traditional areas of statistics, such as population and national accounts

Interpretation of statistical data

That the statistical offices engage themselves more in the evaluation and interpretation of the meaning of statistical data, e.g. to regularly produce up-to-date indicators of national development trends in priority areas

Value-added products

That the statistical offices in this connection upgrade their technical capabilities, in regard to IT facilities (software, hardware and telecommunications) and technical expertise, to provide new value-added services and products

Consultative services

That the statistical offices shift their emphasis from primarily being producers of statistics to become responsible for the development and operation of infrastructure facilities in the form of statistical data bases and advisory specialist services that can assist users in the public and private sectors in utilizing statistical information for decision making

On-line access to statistical data

That the statistical offices to achieve this goal, in regard to 'delivery systems', instead of using statistical publications as the only or primary means of communicating information, tries to increasingly make computerized statistical data available to end users either in a downloaded format for use on a microcomputer, or in the form of statistical data bases that can be accessed through telecommunications

That the statistical offices further expand the tools, e.g. through acquisition of software such as graphics software, specialized statistical packages, etc., that can be made available directly to end users, and develop their expertise to provide advisory assistance to users in this connection

Participation in government decision making

That IDC governments involve the statistical offices more actively in the work of key government planning and decision-making bodies than is normally the case today

That the donors and international aid agencies actively assist those changes in the national statistical systems, and if necessary redirect their programmes in this connection

Human Resource Development Programme

248. Lack of qualified human resources is as mentioned a main barrier to further computerization and IT developments in the IDCs. The problem has both a short- and long-term dimension, and it relates to IT experts as well as qualified users. Particularly in the Pacific, the lack of local expertise has lead to a strong dependence on expatriates with a corresponding high vulnerability regarding the sustainability of the results already achieved.

Short-term problems

249. The short-term problems include:

- Dependence on expatriates who are assigned on fixed-term contracts
- Lack of management appreciation of IT to engage in a qualified way in planning and decision making regarding IT developments and projects at the national level
- Lack of project management capacity to implement IT projects in an effective way

Long-term problems

250. The long term manpower problems relate to the general low level of education in the IDCs and to the problems of migration of skilled manpower, that characterize many IDCs. Those problems will by their nature take long time to resolve, and might in some cases be unsolvable in the national context. In regard to IT developments it is for example unlikely that more than a few IDCs will ever be able to undertake large systems development and programming efforts on their own.

Priority to short-term problems

251. Against this background it is suggested that priority is given to the immediate problems of reducing the vulnerability of already existing computer-supported information systems by increasing their sustainability in the local environment, and improving the management capability of the IDCs in regard to IT developments. It is at the same time assumed that the IDCs for a long period will continue to require outside expertise to undertake major system changes and developments.

Recommendations

252. More specifically, it is within this context recommended:

Information and computer center staff

- a) That IDC governments and donors together develop and implement short-term IT training and professional development programmes for selected computer and information centre staff, to enable them to take responsibility for the operation and maintenance of critical information systems, that are being planned, or are already operational, in the public sector
- b) That these training and professional development programmes are planned and implemented on a person-to-person basis, aiming at consolidating in each computer and information centre sufficient localized expertise and capacity in systems analysis and programming, systems operations including telecommunications, and end-user support (microcomputer hardware and software), to sustain operation and maintenance of the relevant information systems without outside support

Review of personnel policies, regulations and procedures

- a) That IDC governments review internal personnel policies, regulations and procedures (classification, salary scales, recruitment, promotion, etc.) to identify barriers to recruitment and retaining of qualified computer specialists in the government sector, and tries to alleviate such barriers wherever possible
- b) That IDC governments ensure that specialists who have participated in training programmes are employed in the task to which they have been trained, and that an appropriate work environment is maintained in this connection

IT appreciation for managers

- a) That IDC governments and donors give priority to management training for government officials aimed at developing sufficient appreciation of the potential and requisites of IT application to allow them to engage in a qualified way in planning and decision making regarding IT developments and projects in the public sector
- b) That such training at the top level concentrates on personal assistants to ministers and permanent secretaries

Project management

That IDC governments and donors likewise give priority to management training aimed at developing the necessary localized project management capacity for the implementation of IT projects in the public sector

Linking user training to IT projects

That initial training in the actual use of new information systems as a general rule is closely linked to the development and implementation of the individual IT system/application

Developing analytical capacity

That IDC governments and donors in connection with planning and decision-making applications (MIS applications) place emphasis on developing the analytical capacity of users to interpret the meaning of information.

Legal Framework

Legal systems not adapted to IT

253. The legal systems of the IDCs, which are normally based on the systems of the former colonial and metropolitan powers, have as mentioned not been reviewed and if necessary amended in the light of computerization and telecommunications. In some countries this has created problems and uncertainty regarding the exchange of information between public sector institutions, and between the public and the private sector. The most critical general issue is, as pointed out, privacy protection in connection with the use of computerized data bases.

Recommendations

254. It is in this connection recommended:

- a) That IDC governments review their national legal systems in the light of the introduction of modern information technology into the public and private sectors to identify areas, such as privacy protection, third party liability, copyright protection for software, etc., where those systems might have to be modified
- b) That IDC governments on this basis, with the necessary technical assistance from the outside, revise the particular legislative areas identified

5.2 Regional-level Initiatives

255. Regional solutions are, as pointed out in the previous chapters, in many areas a requisite for developing effective information systems in the IDCs. Suitable regional institutions with the appropriate IT policies and programmes are critical in this connection. While the many regional organizations which assist the IDCs have actively supported computerization the results of these efforts have sometimes been limited.

Lack of suitable framework for regional information systems

256. Again the main reasons are the lack of overall direction, coherency, and consistency which often have characterized development activities in this area. The regional organizations, therefore, do not today provide a suitable framework for the regional information systems that are inherently requisites for a more advanced utilization of IT in the IDCs.

257. This section discusses activities which are needed at the regional level to change this situation. The section is divided into three parts:

- IT policies and programmes
- Regional information systems
- Advisory services
- Institutional framework
- Development of human resources

IT Policies and Programmes

258. Despite the fact that most regional assistance projects comprise IT elements

there is normally little coordination between these elements. Generally, the regional organizations have not formulated coherent IT programmes and policies, and their efforts in this area have consequently often been marked by haphazardness and lack of clear objectives.

Recommendations

259. Within this context it is recommended:

Development of regional IT programmes

- a) That the regional institutions serving the IDCs review the IT elements in their internal activities and external assistance programmes as a whole
- b) That each institution on this basis, after consultation with the countries, other regional bodies and donors, defines an IT development strategy for that institution outlining its role and objectives in regard to IT developments in the region
- c) That each institution, against this background, reassesses and consolidates its IT-related activities into one comprehensive action-oriented IT programme

3 elements

That this programme comprises the following elements:

Development, implementation and operation of regional information systems

Value-added services based on those information systems

Advisory services, including training

Regional Information Systems

260. The information systems which have been developed by the regional institutions are first of all statistical data bases which primarily serve internal purposes. Very little of those data are made directly available to the countries. Only a few operational-level regional information systems have been developed.

Recommendations

261. It is recommended:

Access to data bases

That the regional institutions, whenever possible, give the IDCs in the region direct access to their data bases, by telecommunications or by providing down-loading facilities by which computerized data can be extracted for use on a local microcomputer, or by a combination of these two solutions

Value-added services

That they, based on their expertise and data bases, develop value-added services for both the public and private sector in the IDCs of the region

Regional information systems

- a) That the regional institutions shift their emphasis from statistical information systems (which in many cases primarily serve the purpose of 'monitoring development') towards developing and operating regional information systems that play a direct role in the functions of the countries of the region
- b) That they in this connection in cooperation with the IDCs of the region initiate projects to develop and implement computers and telecommunications-based, operational-level, regional information systems in areas such as education, health, tourism, transportation, and employment, which can support and complement national-level systems in those areas
- c) That the Development Cooperation Information System (DCIS), which has been developed in the Caribbean, is 'copied' to the South Pacific region, for example hosted at SPEC Headquarters in Suva, Fiji

Upgrading of technical facilities

- a) That the regional institutions invest in upgrading their computer and telecommunications facilities to support the developments outlined in recommendations 40 to 43
- b) That the donor community support these changes in the regional institutions and their services to the IDCs

Advisory Services

262. With regard to technical assistance, there has been a tendency to concentrate on ad hoc short-term assistance to the national level, most often provided through regional advisers. The qualifications of those advisers have primarily reflected "who is now available from the donors", not been the result of a balanced planning process. The advisory services provided by ESCAP and its Pacific Operations Centre (EPOC) to the IDCs in the Pacific illustrate this situation.

Recommendation

263. It is recommended:

Shift from ad hoc assistance towards institution building support

That the regional institutions, regarding advisory services in the IT area, shift their emphasis from assistance to solving separate, one-time problems ('fire fighting') in the IDCs towards supporting structural changes and institutional developments aimed at improving the conditions for the utilization of information technology in those countries

Institutional Framework

264. Regional information systems and regional cooperation require a suitable, corresponding institutional framework. At the present there are in

most instances no natural organizational settings for discussing and developing regional cooperation in the area of information systems and IT. Generally, a formalized framework for the exchange of IT experiences among the IDCs does also not exist. This means that discussions about regional information systems and cooperation in the IT field, if they happen, have to take place as an adjunct to discussions in existing subject-matter areas

Recommendations

265. Against this background it is recommended:

IT committees

- a) That two high-level IT Committees are established, one in the Caribbean and one in the Pacific, representing the relevant regional institutions and the IDCs in the respective regions, to provide a framework for discussion of common IT issues in the region, including the respective IT programmes of the regional institutions, for exchange of experience in the IT area, and for taking regional initiatives in this area
- b) That each IT Committee comprises a standing Executive Committee with a standing Technical Committee and a number ad hoc Working Groups/Panels each dealing with a special area of interest

Technical committees

That the Technical Committee comprises representatives of key computer and information centres in the region, and in addition to its advisory function vis-a-vis the Executive Committee, serves as a focal point and main vehicle of exchange of IT experience in the region

Ad hoc working groups

That the ad hoc Working Groups/Panels are established by the Executive Committee, normally for a period of two years, to discuss and propose action in specific areas

Permanent secretariat

- a) That a permanent Secretariat is established for each IT Committee, located at one of the regional institutions and with sufficient professional staff to support the work of the Committee including its Technical Committee and Working Groups
- b) That the donors provide the necessary funding for the establishment and operation of this committee structure, in particular for the staffing and operations of the Secretariat, for short-term international consultancies related to the work of the Working Groups, for travel in connection with regular meetings of the Executive Committee and the Technical Committee, and for travel in connection with meetings of the Working Groups

Development of Human Resources

266. IDCs are, with a few exceptions, too small to support national institutions of higher learning and research. This has given rise to the establishment of regional institutions such University of South Pacific and University of the West Indies. These institutions are as mentioned trying to

expand their operations and utility to the countries through extension centres and distance teaching via telecommunication links. One consistent problem has here been funding in connection with the relatively high costs of telecommunications.

267. In the area of computer training, facilities are, again with a few exceptions, only available in the IDCs in the form of vendor-supplied short courses. Professional computer and information systems training generally has to take place abroad. Updating of IT skills and knowledge, once received, is a serious problem.

Recommendations

268. Within this context it is recommended:

Educational networks

- a) That the regional institutions and the donors, in cooperation with the telecommunication authorities and national governments, expand the networking facilities available to the educational institutions in the Caribbean and the Pacific, with long-term agreements regarding the financing of those facilities
- b) That the networking facilities of the Pacific are made available to the IDCs in the Indian Ocean

Diploma studies

- a) That the regional institutions and the IDCs in the Caribbean and the Pacific, in cooperation with the donors, consider establishing regional diploma studies in information technology and systems development located at a suitable regional institution in each of the two regions
- b) That it is considered to use the NCC's (UK) four-level Diploma Computer Studies as basis for those diploma studies

Technology updates

That the regional institutions in the Caribbean and the Pacific, in cooperation with the donors and appropriate technical institutions in the metropolitan countries, establish a series of technical IT workshops in the two regions covering current IT developments and issues, which can serve the purpose of providing regular 'technology updates' to computer and information centres in the IDCs of those regions

5.3 Special Initiatives

269. While national-level and regional initiatives will form the backbone of any programme aimed at improving public sector performance in the IDCs through better information systems and utilization of information technology, global-level or inter-regional initiatives, wherever they can be defined, can have a very large impact, often with a relatively modest investment of resources. The ASYCUDA project is one example. Such initiatives and the resulting solutions might address problems that are too large and costly to solve in the context of IDCs only. The initiatives will thus, as it is also the case with ASYCUDA, generally aim at other countries as well. The impact and importance of global systems will, however, because of the problems of infrastructure building in the IDCs, normally be relatively much higher in those countries.

270. In the following a few areas that might be candidates for global or inter-regional solutions are identified. In regard to the utilization of information technology such solutions might typically comprise one or more of the following elements:

- a) A general software package with documentation and a support organization which maintains and develops the software, and assists users with the implementation of the system, for example by providing training.
- b) A data base and information system accessible through telecommunications and/or computerized copies of the data base or selected parts of it.
- c) Value-added information services and products which for example are available through subscription

Manpower planning and development

271. The area of manpower planning and development in the public sector is one of the most obvious candidates for a common generalized solution. This area receives consistently 'high scores' as one of the most critical problems of development in the IDCs. The area is marked by a high degree of commonality between the countries. And not least, most IDCs have so far done very little to address the problem in a systematic way.

Recommendations

272. Against this background it is recommended:

- a) That UNCTAD at its scheduled expert group meeting on IDCs in July 1990 identifies the area of manpower planning and development in the public sector of the IDCs as a priority area for development and implementation of common solutions, and suggests a proper institutional framework and relevant donors for the work involved
- b) That such a manpower planning and development system tentatively as a minimum would comprise the following modules:
 - (i) A manpower planning module that will provide a vehicle for linking manpower planning in government departments (sectors) in a qualitative way to the general planning process in the public sector
 - (ii) A manpower training module that will provide a tool for linking the planning of manpower training in the public sector to the general planning process in that sector, and a vehicle for describing in a systematic way the training requirements to the training institutions involved
 - (iii) A skills data base comprising information about all employees in the public sector, to provide a tool for improved utilization of existing manpower resources in the public sector

Health systems

273. The area of health services is another obvious candidate for development of common solutions. The development and implementation of national health systems in the IDCs generally require continuous access to outside resources

and expertise. In particular in regard to secondary health services, i.e. hospitals, none of the IDCs are or will ever be able to build and operate international-standard facilities solely on a national basis.

A case for telecommunications-based services

274. The present solution of sending severe and difficult cases abroad to treatment in hospitals in the metropolitan countries generally based on local decisions is not satisfactory and very expensive. An integrated health system comprising national-level facilities and international facilities which are connected through a computer and telecommunications based information system could provide higher-standard health services to the IDCs in a much more cost-efficient way than the present systems.

Recommendations

275. Against this background it is recommended:

- a) That UNCTAD at its scheduled expert group meeting on IDCs in July 1990 identifies health services in the IDCs as a priority area for development and implementation of common solutions, and suggests a proper institutional framework and relevant donors for the work involved
- b) That an initial pilot project involving one IDC and one or more international hospitals abroad is defined within this context comprising at least the following elements:
 - (i) Development of an on-line patient information system comprising a common data base with individual patient records on hospitalization and other treatments at both national and international facilities
 - (ii) Development^f of a computer and telecommunications based diagnosis support system which will (1) assist national-level health service staff in determining the diagnosis in a particular case and deciding on the relevant treatment including whether this has to take place abroad, and (2) facilitate communication between national staff and experts abroad during this process
 - (iii) Development of a set of administrative, computer and telecommunications based facilities which will support the management and administration of such an integrated health service system
- c) That a full-scale project is defined on the basis of this pilot project for implementation in both the Caribbean and the Pacific

5.4 Role of Donors

276. Donor assistance has been and will continue to be vital for IT developments in the IDCs. The way in which international assistance is provided, however, has also contributed to some of the problems, notably the lack of coherency and institutionalization, which have characterized computerization developments in the IDCs. Some changes in the way aid-funded projects are defined are, therefore, required if the investments in IT developments in the IDCs are to become cost-effective.

Recommendations

277. Within this context it is recommended:

That the donors in addressing development issues in the IDCs give high priority to the development of their information systems and the corresponding utilization of modern information technology

Need for IT program

- a) That the donors in this connection realize that the introduction of IT in the IDCs is a long-term undertaking, which will require international assistance on an on-going basis
- b) That the donors in this connection tries to provide IT-related assistance within an overall IT programme which corresponds to the national IT strategy and respects national-level coordination mechanisms, cf. also recommendations 1-4
- c) That the donors, when more than one provide IT assistance to an IDC, tries to coordinate their IT programmes in the context of the national IT strategy

IT implies institution building

- a) That the donors generally consider IT projects institution-building projects, and define their content and time schedule correspondingly
- b) That the donors in this connection give organizational and human resource development high priority in IT projects

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